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ABSTRACT

The major focus of this guide and its accompanying student manual (CE 010 397) is to help the student understand the manufacturing enterprise. (The guide and student manual are part of a manufacturing cluster series which addresses itself to career awareness, orientation, exploration, and preparation.) Seven sections are included. An overview of career education and manufacturing history is presented in the first two sections along with a discussion of the structure of manufacturing, which is systems oriented in order to show interrelationships and to promote understanding of it in three highest common denominators--functions, processes, and products. Sections 3 and 4 describe the generalized program development paradigms and includes both instructional and curriculum development models. Guidelines and a description of an exploration program in manufacturing occupations using the food and kindred products industry as an example are presented in sections 5 and 6. The last section contains the following 20 program product categories, with each containing selected activities and experiences and sources of information related to function: Ordnance and Accessories; Tobacco Manufacturers; Textile Mill Products; Apparel and Other Finished Fabric Products; Lumber and Wood Products; Furniture and Fixtures; Paper and Allied Industries; Printing, Publishing, and Allied Industries; Chemicals and Allied Products; Petroleum Refining and Related Industries; Rubber and Miscellaneous Plastics; Leather and Leather Products; Primary Metal Industries; Fabricated Metal Products, Machinery and Transportation Equipment; Machinery, Except Electrical Equipment; Electrical Machinery, Equipment and Supplies; Transportation Equipment; and Professional, Scientific, and Control Instruments. (HD)

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THE MANUFACTURING CLUSTER

EXPLORING MANUFACTURING OCCUPATIONS

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INSTRUCTOR'S GUIDE

2

CE 010 398

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This document is part of the Manufacturing Cluster Series which addresses itself to career awareness, orientation, exploration and preparation.

The series includes student manuals and instructor guides for use at the secondary level.

The list of titles in this series is as follows:

Exploring Manufacturing Occupations: Student's Manual

Exploring Manufacturing Occupations: Instructor's Guide

Occupational Preparation - Inspection and Quality Control: Student's Manual

Occupational Preparation - Inspection and Quality Control: Instructor's Guide

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FOREWORD

This guide is directed toward the United States Office of Education emphasis on Career Education via a cluster concept. The Manufacturing Cluster is the area of presentation in this guide.

Manufacturing Enterprise contains considerable information and data about careers, occupations, jobs, functions, processes, products, related knowledges, skills and attitudes. It is difficult to detail all aspects of the subject.

This project effort used the research mode due to the above condition. Whether or not there is Career Education in the Manufacturing Enterprise is the main concern. Therefore, this guide dwells on the first parameter of research, namely, understanding. Further, Manufacturing Enterprise, singularly, was the object to be understood. It was felt that before much work went into full scale curriculum development and program operation, in either Career Education and/or Manufacturing Enterprise, the understanding of the Manufacturing Enterprise was the prime requisite. This posture was taken as being necessary due to the attempted linking of the human career dimension to and within this typical enterprise. Because of the concentration on understanding, and in view of grant constraints and unavailability of proven methodology to handle prediction and control dimensions, this guide is just that--a guide, not a program.

The guide is arranged in order to present an overview of Career Education and manufacturing history in the first sections. This is followed by a Structure of Manufacturing which is systems oriented in order to show interrelationships and to promote understanding of it in three highest common denominators, namely, Functions, Processes and Products.

Next, the guide describes the generalized program development paradigms and includes both instructional and curriculum development models. The next section deals with an Exploration Program in Manufacturing Occupations using the Food and Kindred Products industry as an example. The last section of the guide lists Product Categories, containing selected Activities and Experiences and Sources of Information by category, related to function.

The Student Manual to be used with this Instructor's Guide, has the same general format on Career Education and Manufacturing. The Student Manual then picks up at the Product Category section and is expanded in occupational information at specific levels. The two publications should be utilized together in teaching manufacturing occupations.

The main reason that the guides were developed in this mode was to allow the necessary prerequisite of understanding to be addressed first. This then can be taken by the school system and support personnel consortia and be arranged and/or modified to suit their purposes for Training, Education and/or Development.

The utilization of this guide should enable a school system and its support personnel to begin development of relevant and meaningful programs in the careers dimension of human resource development using specific job-tasks developed in the Student Manual.

A major factor to be considered in the use of this guide is that the models transcend cluster-approaches to describe the world of work. Manufacturing Enterprise uses the same types and kinds of personnel, equipment and products as do nearly all other prescribed clusters. The articulation between manufacturing and the world becomes immediately evident when presented in the systems format. It is felt that this will enable a much wider band of exposure-exploration activities to be considered with a minimum of structures and parameters interferring with the learning process.

It is the prime purpose of this guide to promote understanding of the Manufacturing Enterprise. It is sincerely hoped that it has accomplished this purpose.

John E. Radvany
Deputy Assistant Commissioner
New Jersey Department of Education
Division of Vocational Education

ACKNOWLEDGEMENTS

As with any project encompassing such a diversified field as Manufacturing Enterprises, this is the result of the efforts of countless persons who have supplied the knowledge, and the facts upon which it rests. Philosophy, rationale, information, critique, testing and change have been reviewed by special personnel who worked on, or supplied information to this project.

To all the many advisory personnel and committee members, sincere thanks are due. It is impossible to list them all and delineate their contribution.

The Manufacturing Cluster Series of which this is a part represents an effort in curriculum development by the United States Office of Education, the New Jersey Department of Education and Fairleigh Dickinson University.

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CAREER EDUCATION

INTRODUCTION

The American educational system has been described as the greatest achievement in democratic processes attempted by any people. The system was built upon the concept of equal educational opportunity for all. Its goal is to allow each person to become trained and/or educated to a level commensurate with their inherent capabilities. In support of this concept and goal, it was required that compulsory attendance in the school system, from six to sixteen years of age, be maintained. The concept, goal and requirement of American education differ markedly from the educational systems of many countries.

While it was possible to meet the requirement of compulsory attendance, meeting the idealized goals has been a problem. Attainment of the goal and concept has been a concern of the political, technologic, economic and sociologic systems during the history of this nation.

A major forward step came immediately after World War II, when all of the various systems concentrated on human resource development in the educational delivery system. During the period of time from the late 1940's through the 1960's, legislation supported integration and attendance to minority group educational interests and problems; technology enabled industrial, trade, commerce and general business expansion and, at the same time, created new occupations and jobs.

After the 1960's a major charge evolved from general society. The massive and dynamic change period generated the statement that education was neither meaningful nor relevant. The educational system and all interfacing systems are attempting to provide both an answer and new posture to address that charge. One of the approaches is called Career Education. It is to this charge that Career Education programs are addressed, formed and operated. The manner of approach is to examine the career work related components of human endeavor and to determine how educational systems can be utilized to enhance the life-cycle human career dimension.

CAREER EDUCATION CONCEPT

The term Career Education, is a concept comprised of many and varied sub-concepts, all centering in education but related to many factors concerned with life and work.

The primary process used in this manual is representative of career education, its concept and scope.

CAREER EDUCATION GOALS

The major goals of Career Education are:

1. To make all education more meaningful and relevant to individuals and their career development.

2. To provide the guidance, counseling, and instruction necessary to develop self-awareness and self-direction; to expand occupational choices and aspirations; and, to develop appropriate attitudes toward the personal and social significance of work.

3. To ensure the opportunity to learn a marketable entry level skill prior to leaving school.

4. To provide knowledge and skills requisite to further education and employment upon completion of secondary school programs.

5. To assist the individual in finding employment or in receiving further education.

6. To utilize community resources in the education system.

7. To increase the available educational and occupational options through a system which will permit entry and reentry into either the world of work or an educational system.

SCOPE OF CAREER EDUCATION

Career Education is a comprehensive educational program beginning in childhood and continuing through adulthood. The subject-oriented curriculum of the elementary and secondary schools is restructured to include career development. In the

primary grades, Career Education is as important a component of the educational system as reading, writing, and arithmetic. The students explore the world of work and familiarize themselves with many occupational fields and gain an insight into, and a respect for, both work itself and the people who work. In junior high school, the student studies the structure of occupational fields and begins experience-centered learning in each of these fields. In the eighth or ninth grade, students explore various jobs and job families, so that by the tenth grade, they have already gained initial entry level employment skills.

Career Education prepares the student, leaving the school system, with both employable skills and a foundation for building new and improved occupational levels in the future. Also, Career Education recognizes that people may reenter the educational system at any point for upgrading skills or learning new techniques.

PHASES OF CAREER EDUCATION

Career Education, as initially conceived, consists of four phases as in Figure 1, page 5.

Phase I - Career Awareness
Phase II - Career Orientation
Phase III - Career Exploration
Phase IV - Career Preparation

Phase I - Career Awareness

Career Awareness is a major departure from the traditional concepts of vocational education. It was formerly thought that work preparation should start in high school. Research, however, has repeatedly shown that the early years are the most important learning years. Since Career Education is concerned with both work and work attitudes, it is important to introduce Career Education at the beginning of formal schooling. During Phase I students will become acquainted with all of the Career Education fields and learn that work is honorable, respected, and important.

Phase II - Career Orientation

Career Orientation, which normally begins in junior high school, assists students in identifying talents, aptitudes, interests and work requirements in the world of work. They will not only acquire the basic knowledge necessary for making a career choice, but they will also learn the structure of career fields, and the variety of job levels in each. The concept of career ladders will become clear and the student will be able to apply it

to several selected career fields. Faculty members and counselors, as well as resource persons from business and industry could all participate in programs, each offering their own special services to students in the career education phase.

Phase III - Career Exploration

Career Exploration means in-depth study of several jobs or job families through simulation, vicarious experience and hands-on opportunities. The basic objectives of this phase are:

1. To provide in-depth exploration, beginning specialization, and skill development training in a selected occupational field/job family.

2. To improve student performance in basic and related subject areas with emphasis on career development.

3. To provide information and guidance in the selected occupational family in conjunction with entry level job preparation and/or preparation for continuing education.

Phase IV - Career Preparation

Career Preparation, the attainment of intensive skill, technical knowledge, work habits, attitudes and safety judgment in one or more jobs or job families, is the final step in Career Education. The objectives for Career Preparation are:

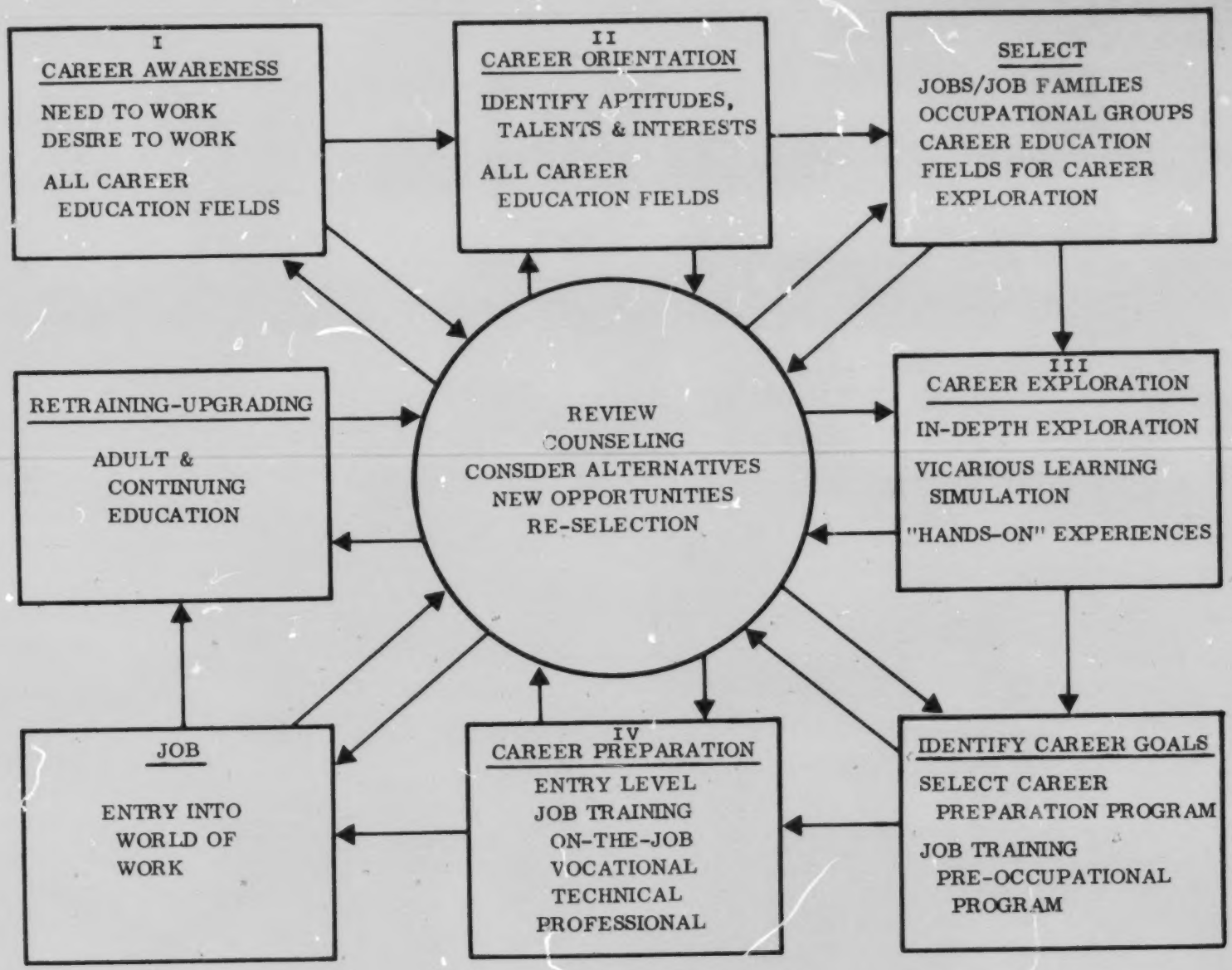
1. To provide specific training in a chosen occupation/occupational family in preparation for job-entry and/or further education.

2. To improve student performance by relating studies to the chosen area of work.

3. To provide occupational information and guidance with job preparation, as well as prepare the student for further education and direction.

4. To insure that students meet the job-entry, and/or advanced educational prerequisites of education and skills needed for their occupational-career choices.

Figure 1 - Phases of Career Education



SUMMARY

The basic concept of Career Education is that it is an educational vehicle which attempts to integrate the work-related aspects of careers, occupations and jobs within the framework of human development in given or selected environments.

Career Education is:

1. To make all education more meaningful and relevant; and,

2. To provide an environment and opportunity for all students to acquire attitudes, knowledge and skills at their chosen level and in their chosen career field.

The scope and phases of Career Education cover the normal educational life span of most students, from elementary through secondary schools in four phases, namely: Awareness (Grades K-5); Orientation (Grades 6-8); Exploration (Grades 9-10); and, Preparation (Grades 11-12). Also, Career Education continues similarly through post-secondary, higher education, adult and continuing education.

THE MANUFACTURING ENTERPRISE

BRIEF HISTORY

Manufacturing is an enterprise that uses land, capital, and labor to produce goods. It is the process by which man adds utility to the materials that nature furnishes and includes such enterprises as textile mills, factories, mines, electrical power plants, meat packing houses, food canneries and petroleum refineries.

Production in an enterprise begins with natural resources such as land, minerals, water, and timber. Without natural resources man could neither survive nor improve his standard of living. Yet, in their original state, most natural resources do not satisfy human wants. Therefore, these natural resources must be processed to suit needs and desires. This is accomplished by manufacturing enterprises.

From the beginning of time, people spent a greater part of their waking hours searching for food necessary for survival. In the Paeolithic Age, tools appeared for the first time and man began to change from hunter to producer. During the Neolithic Age, man was using the loom, the wheel and the kiln. Technological development progressed through the ages and eventually led to the Industrial Revolution. At the beginning of the Industrial Revolution, there were new materials, better tools and more efficient machines. Conversely, the number of farmers decreased substantially as rural people migrated to the towns and cities. The industrial society had begun and it was to drastically alter the life of all people.

In earlier times, most goods were produced in the home. As technology developed, manufacturing operations were transferred from the home to the factory and goods were produced with machinery rather than totally by hand. The growth of capitalism and private enterprise paralleled the rise of the Industrial Revolution. Many new machines were invented. One of these, for instance, was Hargreaves' invention of the spinning jenny. This made it possible to produce more goods per day than ever before. Consequently, as prices went down more people could afford to buy the goods. Increased production and decreased labor costs resulted as factories located on stream banks and water-powered machines replaced hand-powered machines.

American manufacturing dates back to the first permanent English settlement in the New World. In 1620, New England ship-builders found the natural resources they needed--hard woods, soft

woods, and pine sap from which to make turpentine, resin and tar. Saw mills were operating as early as 1631. When iron ore was discovered in Massachusetts in 1654, John Winthrop, Jr., son of the Governor of the Massachusetts Bay Colony, went to England and brought back both equipment and skilled iron makers. Braintree, Massachusetts, was the site of the first iron furnace in the colonies. In 1665, Groton, Connecticut, gave twenty acres of land to a group who built a mill for grinding corn. The output of such colonial industries as these eventually helped make political and economic independence possible for the United States. The people who founded America realized the importance of trade and manufacturing as they pertained to continued independence and growth.

In the 18th and 19th centuries, a family lived on what they raised on the family farm; used the tools made by father and sons; and, wore the clothes spun and sewed by mother and daughters. There was also some exchange of simple goods between neighbors. The early settlers, however, had come to the New World to make a better living and to live better, so even in the log cabins of frontier villages there was fine English china, English woven cloth and other English manufactured goods.

During the wars of 1776 and 1812, the United States could not depend on England for manufactured goods. Factories, of remarkable diversity, began to spring up across America, setting the stage for the American Industrial Revolution.

Toward the end of the 18th Century, a number of inventions ushered in the Industrial Revolution in the United States.

Eli Whitney, the inventor of the cotton gin, demonstrated the value of interchangeable parts in making and repairing rifles. During the American Revolution each rifle had been painstakingly made by hand. The hammer of one would not fit the trigger of another, the barrel of one could not be used with the stock of another; if one part in a rifle broke, the entire gun had to be sent to a gunsmith to be repaired. Whitney's ideas resulted in the molding or stamping of identical parts. Assembling standard parts into a finished product, rather than handfashioning individual parts, saved both time and money. Eli Terry, a New England clockmaker, who was one of the first to use this mass production method, turned out standardized clocks by stamping out identical gears. His clock prices dropped from $25 to $5 per clock by using this assembly technique.

In 1769, James Watt developed the steam engine. A mine operator then put the engine on wheels and pulled coal over wooden rails to the nearest town. This was the beginning of the railroad. Factory owners soon learned that steampower was less expensive than manpower, more convenient than waterpower and were

quick to utilize it in factories. During the first year that steampowered sewing machines were used in the manufacture of shoes (about the time of the Civil War), the shoe industry doubled its highest previous annual output.

Farmers also benefited by industrial inventions. Cyrus McCormick developed the reaper and soon thereafter there were steam plows, mowing machines, and threshers. On the seas, steam driven ships began to take the place of sailing ships. Machines driven by steam made more machines driven by steam. In 1860, the United States was the fourth largest manufacturing country in the world and by 1894 it was the first. By 1917, this country's manufacturing created as much wealth as the next three highest industrial-oriented countries combined.

The assembly line method of production was another powerful force in implementing and modernizing manufacturing. Mass assembly techniques, begun in 1903 by Sears Roebuck, led to Henry Ford's assembly line production of automobiles. The era of mass production with reduced costs began. Formally designed luxury items were available to the American wage earner for the first time.

It is estimated that production technology and methods have made it possible for the average American worker to produce 250 times more in one day than is produced by a worker in an underdeveloped nation. The expansion in production technology and methods goes on and will continue to go on as long as inventors and scientists have incentive and reason to discover new machines and methods for production purposes.

Technological advancement has continued at an ever increasing rate. It is estimated that there have been more new inventions since 1960 than in all previous history. The impact of space exploration, for instance, is just now beginning to appear in all forms of industrial enterprise. Space technology has resulted in stronger but lighter materials and smaller but more sensitive electronic equipment. New systems of management and production have been developed.

Perhaps the biggest advance in technology and manufacturing in the past twenty years has taken place in the field of communication. The impact of computers and electronic communication devices is startling. Future manufacturing holds both the promise of new development and the challenge to meet the needs of an expanding population with its ever increasing appetite for more goods.

The principal function of manufacturing is to produce the goods desired by society. This process creates jobs, income for workers, goods for customers, and profits or losses for owners.

A manufacturing firm that does not produce a marketable product cannot continue to exist. We are all consumers, and we expect the products we buy to be of satisfactory quality and at a price we can afford. Technology and advanced manufacturing techniques have made it possible to lower the prices of goods to within the reach of increasing numbers of people.

CHARACTERISTICS

Manufacturing enterprises have certain characteristics in common whether they are large or small. However, there are differences in the type and kind of characteristics. There are great differences in scope, purpose, work force composition, tools, machines, and facilities when comparing a General Motors automotive plant with that of a lamp shade plant. The following characteristics are common to all manufacturing concerns:

FACILITIES

Facilities include buildings, grounds and equipment necessary to house and support the enterprise.

FINANCE

Manufacturing requires money. Money may be borrowed to start the enterprise--from banks, private individuals (stocks and bonds) and other sources. Money is a resource needed in day to day operations to convert materials, machines, and services, into products. Manufacturing Enterprise represents money invested. However, it also provides economic growth by its internal and external cash flows on a day to day basis.

MACHINE TOOLS

A very familiar characteristic of manufacturing is its machine-tools (machinery). These range from simple hand tools (files, hammers) to giant computer-run machinery capable of great accuracy. The nature of the machinery necessary to manufacture the products of a particular Manufacturing Enterprise influences the type and kind of worker that can be employed (skilled or semi-skilled).

The type and kind of machine tools also indicate whether or not the Manufacturing Enterprise is to be mass production or limited production in scope.

WORK FORCE

Another familiar characteristic of manufacturing is the work force. The work force includes all who work in and for the enterprise. This range covers the entire scope of occupations from president of the corporation to external field personnel in regionally located warehouses. Since late in the 1800's many classifications have been made to the work force. These range from unionized work force through professional, scientific and skilled/unskilled.

MATERIALS

Although you may have facilities, finance, machine tools and a work force, in order to operate you need materials. This materials classification characteristic ranges from raw materials (ore, furs, oil) to finished materials (products and equipment). The term materials is both specific and comprehensive in coverage, as it is used in general society and in manufacturing enterprises. Materials to the foundry can be the ore from which iron-steel is to be made. Materials to the assembly line worker can be completely finished component parts such as electrical wiring and electronic components as well as tape. Usually, some interpretation of this term is needed as it is used in characterizing both the Manufacturing Enterprise overall as well as in examining its internal structure.

TIME

While time, in and of itself, is not generally used as a hard characteristic describing Manufacturing Enterprise, it is a major factor to be considered in operations. Today, there is a fast-food business; the automotive industry manufactures a given number of cars per day. Generally, the work force is paid by the hour. Money is borrowed on time-bases. Machines are operated and maintained on a time-schedule. Time-delivery is money to the manufacturing plant. Time is a very real commodity used by manufacturing enterprises. The use of time determines whether or not they make a profit, take a loss, or stay in business.

Although many times a characteristic of the manufacturing enterprise is spoken of in terms of an environment-of-manufacturing, this cannot be classified, properly, as a commonality. The environment takes on many dimensions such as a worker's view of working times, compatibility with fellow workers, level of air quality, heating and parking facilities.

A Manufacturing Enterprise has two environments, internal and external. The internal environment is composed of all the characteristics aforementioned and their actions and inter-actions

within the physical confines of the plant. The external environment is comprised of the local community, customers and the affects/effects of the national manufacturing community as well as government controls. The many differences in elements comprising manufacturing-environment precludes using this as a typical characteristic. Mistakingly, this is usually treated solely or mainly as being equivalent to working conditions, not truly the case. For this reason, environment is not treated in this guide as a common characteristic of Manufacturing Enterprise.

PRODUCTION AND PRODUCTIVITY

Production is defined as the creation of a utility or the changing of materials into more useful goods and services. It is necessary because most raw materials in their natural state do not provide sufficient utility. There is an important difference, however, between production and productivity. Production refers to the total quantity of goods produced whereas productivity refers to the production quantity in a specified time period.

Productivity may be defined as a measurement of output per man-hour, or as the relationship between input (factors necessary to produce goods and services), and output. Many factors determine productivity and it is often difficult to determine which contributes most to any given increase in efficiency. Some of the important factors in productivity include:

1. technological improvements reflecting the ingenuity of inventors, engineers, and scientists;

   A complete change in the use of energy has taken place since the mid-1850's when almost all industrial effort was human-powered. Today almost all of the energy used in production is electro-mechanical.

2. management factors reflecting new skills and knowledges as well as attitudinal changes and influences;

   Many increases in productivity result from organizational and procedural improvements rather than from increases in man-machine energy and capability. Recognition of these factors, especially with management systems, plus increased knowledge of man-machine efficiency developed during the last decade, have enabled management labor to increase production and productivity.

3. financial factors which determine the availability of capital;

   The availability of a technological innovation does not mean it will be utilized. Someone must be willing to adopt it and this requires capital investment. Capital or money is supplied by individual investors. Private ownership of American manufacturing firms is broadly based. The corporate form of business, where many investors pool their capital to form a single company, has been a major factor in industrial expansion over the past century.

4. labor factors, which include work attitudes and skill levels;

   Employee experience, work attitudes, skills, health and morale are important human factors affecting productivity. Even the most modern automation devices must be people-maintained and people-directed. The greatest resource of any organization is its human resource.

5. government regulation of such natural resources as land, mineral deposits, air, water and forests;

   Continued increase of consumer demands has decreased natural resources and has made the availability of natural resources an economic factor in manufacturing. Government, therefore, has had to regulate resources. Industry has had to promote invention and use of new materials or the recycling of used materials in order to maintain productive capability.

Society can raise its standard of living by increasing its production of goods and services. The measure of its success is determined by how well industry produces. The American economic system has been more successful than any other in satisfying consumer demand.

CHANGES AND PROGRESS

Since 1950, technological advancement has been so great that it has been said America is undergoing a second industrial revolution. Manufacturers continue to make great strides to meet the increasing demands of consumers. Yesterday's dreams are today's necessities. Manufacturing will continue to play an essential role in society's quest for better products. Since World War II society has become much more complex and its demand for goods and

services has expanded dramatically. Manufacturing is a principal element in the level of the American economy both by its capacity to produce and in its ability to provide employment. Unquestionably, the future will see continued changes in manufacturing and even greater demands for new products and services.

MANUFACTURING AND SOCIAL PROGRESS

Historically, social progress reveals an ever increasing gain in providing better education for more persons; increasing life expectancy; providing opportunities to greater numbers of people in cultural and recreational affairs; and, generally, increasing standards of living. Social progress is usually linked with the Manufacturing Enterprise through the fields of sociology, economics, technology and political endeavor.

Manufacturing is a direct reflection of all these fields and reflects the singular and combined influences of each. Manufacturing enterprises evolve from home-industries as they respond to such influences as:

more and cheaper goods;
response to technological improvements and efficiencies;
necessity for economic and political strength;
creation of opportunity for employment; and,
change dynamics of world markets.

The role of manufacturing enterprises is, at times, a leading factor in creation of new markets and materials; and, a lagging factor as it attempts to meet sudden demands for goods and services. This area of Manufacturing Enterprise can be seen and studied by reference to Gross National Product (GNP), which reflects the level of inflation, recession, depression and growth.

Relative to education, Manufacturing Enterprise affects school systems by virtue of its forecasts for types and kinds of workers for their work force. The school system responds with revised curriculum and improved programs; utilization of new training techniques, methods and equipment; and, by providing guidance information and counseling to students at their various decision points.

The role of Manufacturing Enterprise changes with time and general social progress. As the capability for supplying needed and desired goods becomes attainable in a given time period, the company role shifts to include more service functions to the consumer.

A shift from primary manufacturing of goods to one of including services--customer relations, community relations, support of community activities, servicing and maintenance of goods, expansion in legal, financial, personnel and marketing activities--permits the scope of Manufacturing Enterprise in society to influence and be influenced by social progress.

THE STRUCTURE OF MANUFACTURING

The structure of Manufacturing Enterprise is shown in Figure 2, page 16. The elements of manufacturing are depicted as being inter-related by forming the elements into a three-dimension box. The elements are:

1. Functions:

   Management and selected sub-functions
   Support and selected sub-functions
   Engineering and selected sub-functions
   Factory and selected sub-functions

2. Processes:

   Acquisition of Raw Materials
   Formation of Standard Stock
   Components Production
   Assembling
   Finished Product
   Distribution

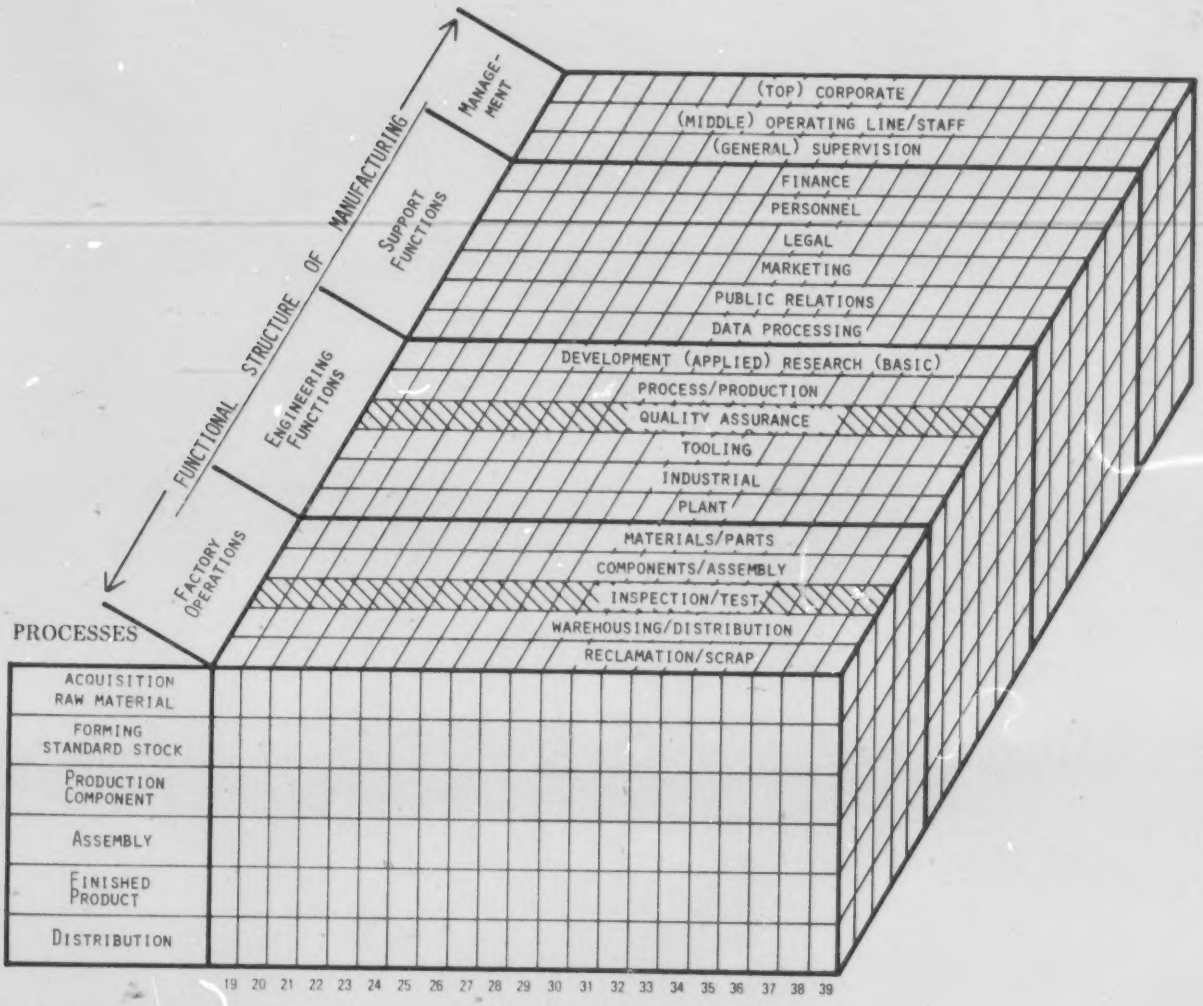
3. Products:

Products are numbered along the base of the box-figure from 19 through 39. The product categories are shown in Table I, page 17. A full range of products and related information about each category is found in this Manual.

This model of Manufacturing Enterprise is quite representative of any selected manufacturing industry for purposes of understanding the operations of manufacturing.

The model is useful for an overview of any function of sub-function of manufacturing for purposes of awareness, orientation, and exploration. In such dimensions as occupational profile, needed skills and knowledge, present and future career prospects, mobility in and between industries at a chosen career level, and career ladder progression, the model can be useful to the student.

Figure 2 - The Structure of Manufacturing



STANDARD-INDUSTRY DESCRIPTORS STANDARD INDUSTRIAL CLASSIFICATION DIVISION D-MANUFACTURING: MAJOR GROUPS 19-39

TABLE I

STANDARD INDUSTRIAL CLASSIFICATION MANUAL

INDUSTRIAL DESCRIPTIONS

DIVISION D; MANUFACTURING*

GROUP	DESCRIPTION OF INDUSTRY
19	Ordnance and accessories
20	Food and Kindred products
21	Tobacco manufactures
22	Textile mill products
23	Apparel and other finished fabric products
24	Lumber and wood products
25	Furniture and fixtures
26	Paper and allied products
27	Printing, publishing and allied industries
28	Chemicals and allied products
29	Petroleum refining and related industries
30	Rubber and miscellaneous plastics products
31	Leather and leather products
32	Stone, clay, glass and concrete products
33	Primary metal industries
34	Fabricated metal products,except 19,35,36,37
35	Machinery except electrical
36	Electrical machinery
37	Transportation equipment
38	Professional,scientific & control instruments
39	Miscellaneous manufacturing industries

*STANDARD INDUSTRIAL CLASSIFICATION MANUAL. Office of Management and Budget. Executive Office of the President; Division D; Manufacturing; pp. 52-214; 1972.

GUIDELINES FOR INITIATING A CAREER EXPLORATION PROGRAM IN MANUFACTURING OCCUPATIONS

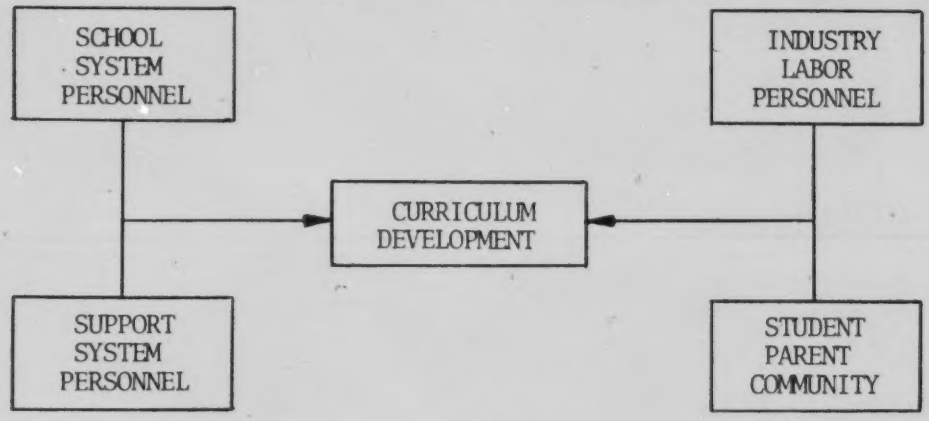
INTRODUCTION

The purpose of this guide is to assist the teacher in establishing a manufacturing Career Exploration Program. Do not use it as a substitute for good judgment. The classroom is unique and must determine program objectives. The teacher needs the full support of administrators, students, parents, counselors, librarians, and other school staff as well as the support of industry personnel--executives, public relations employees, personnel officers, union representatives, and rank-and-file workers. In short, this is a cooperative project in which the teacher will be the coordinator.

GENERALIZED PROGRAM TEAM MODEL

Because the scope of manufacturing is so inclusive and the purpose of the sending and receiving systems many, it is recommended that a program team be formed before any educational activity in the sphere of Manufacturing Occupations is undertaken.

Basically the program team model is prescribed as shown.



GENERALIZED TEAM MODEL

It is felt that such a consortia is a necessary concommitment to a successful program in exploration and preparation activities concerned with Manufacturing Occupations program. This is especially true when particular facets of Manufacturing Enterprise and occupations are studied, discussed and/or experimented with outside the Manufacturing Enterprise environment. In order to have a proper program in exploration or preparation study and activities it will be necessary to have the combined knowledge, resources and skills of the consortia available to the teacher.

MAJOR PRE-OPERATIONAL FACTORS

The following Career Education program pre-operational factors must be taken into consideration before proper program design can occur.

TIME

When time is the dimension discussed and utilized as a program profile characteristic, the following typical questions should be answered before program design begins:

1. Is time to be related to program length on a discrete or continuous basis?

2. Is time related to acquisition of program objectives on a normalized student population basis or individual basis?

3. How is time to be allotted among the school system and/or industrial and support factions?

4. Is the time increment desirable, for this type program, compatible with conducting on-going normal scholastic enterprise?

These typical questions will evolve and must be answered before program design can be considered in scope, objectives and purpose. The school system, like Manufacturing Enterprise, is an economic system and has to consider time as a money-factor constraint on its capability. The particular objectives and scope of the student-school system will be a major input to this dimension. Some objectives will be identified and met rapidly--such as enumerating and profiling the major activities of management (plan, organize, select personnel and equipment, direct and control), while others may take years (capability to absorb all the skills, knowledges and attitudes necessary to be a competent, satisfied and advancing worker in any career field or occupation).

FACILITIES

The facilities available for the conduct of the program are another constraint (problem) to be considered. The availability of the facilities can be quickly determined by a survey of the local community. This will allow possible consideration of providing experiences in visiting nearby facilities and, perhaps, some selected on-line experiences. However, for the most part, simulation will be the major method utilized during program operation. The school system personnel and consortia members should work closely together in order to maximize introduction to the real world.

The facilities program element, like the financial element, points out the need for cooperative program design in this extensive field of manufacturing occupations exploration and preparation.

FINANCE

Finance, like time and facilities, will be a major program constraint which must be pre-considered before program design begins. The political aspects in regular school systems are well known and have their own financing problems. Viewing exploration or preparation in manufacturing occupations as an add-on or integrated program may cause additional problems in the time and facilities constraints. This is another major area where both direct and indirect aid from the consortia members can be a major factor in problem resolution.

MATERIALS

Materials for a program dealing with exploration and/or preparation will generally be determined by the school system and be based on such factors as:

1. geographical location;
2. cost-availability bases;
3. consumable or not;
4. accessability;
5. safety of operation; and,
6. degree of exploration and preparation undertaken.

Materials in support of most major occupational classifications exploration and preparation activities are available from commercial sources. Many of these are listed in the resources list in this guide.

It is in the materials problem area that the state, community, industry and union support personnel can give the most direction and aid. At the present time it is not possible to give, or estimate, a per-student hour, semester or year rate for

any given occupational exploration or preparation program. Specific vocational and industrial arts program personnel could supply some indication of costs on a comparative basis. These could be used as estimates to be considered or determined, for the degree and scope of program goals and objectives.

PARTICIPANT ROLES

The success of the program for exploring and preparing for careers in manufacturing depends to a great extent upon the people assisting the students with their individualized programs. Parents, school staff, and persons from business, industry, and the community may assume specialized roles in helping the students. A primary task of a career exploration instructor is to coordinate the roles of all these people with whom the students come in contact. This section will delineate these roles.

Many of the people will be unfamiliar with the roles they will assume. The teacher, therefore, must familiarize them with their responsibilities and what is expected of them. As the participants understand and agree to their roles, the more smoothly the program will run.

The following descriptions are written in general terms which may be used as they are stated or revise to fit teacher needs. At the initial meeting with the participants, hand them a brief written description of their role. This advance information could then be reviewed immediately prior to actual program activities.

1. Administrator Roles

   a. Arranger of finances, personnel and facilities
   b. Supervisor of on-going programs
   c. Staff development
   d. Community relations interface

2. Staff Specialist Roles

   a. Instructor and/or learning team manager
   b. Curriculum development
   c. Media and materials development
   d. Program coordination

3. Student Roles

   The importance of students is revealed by the fact that they are the main concern of the educational system. The specific roles played by the student will be both active and passive. This is necessary since the work-oriented aspects will have two dimensions in the explora-

tion and preparation phases, namely, vicarious (hearing about, seeing) and simulation, or direct experience acquisition.

During different program phases, the student will assume both roles, but central to each of these roles should be the following particular role-parameters:

a. Program Inputs

Program objectives determination
Criteria formulation
Self-evaluation

b. Program Output

Program evaluation

4. Support Personnel Roles

Support roles will generally encompass the following areas:

a. Information specialists
b. Counseling/guidance specialists
c. Program evaluators
d. Learning theory specialists
e. Career field experts
f. Union theory and practice experts
g. Program management specialists
h. Employment specialists
i. Testing specialists.

All of the above rules in support of the program can be obtained from federal, state and local governments; departments of labor and education; business, trade, commerce and industry; unions; associations; librarians and commercial or trade publishers; and other national and local resources. It would be well to consider that these personnel, manifesting specialist-expert roles, can be a dynamic on-line part of program activities and not left in purely advisory-staff positions. It should be remembered that the knowledge of manufacturing is in Manufacturing Enterprise and not in the school system.

GENERALIZED INSTRUCTION MODEL

The scope of Manufacturing Enterprise, in knowledges and skills, volume of products or types and kinds of inherent activities presents a finite and simple straight forward approach to its total

understanding. The easiest way to explore manufacturing is to utilize a general interrogation model. The model is comprised of comprehensive classes of activities which will be useful when interrogating manufacturing in any or all dimensions of its structure; by function; by process; or by product. These model classes are:

COMPREHENSIVE MODEL

a. Description of career or occupational field
b. Determination of field scope and content
c. Determination of where field content resides
d. Acquisition of field content in format desired
e. Analysis of information for desired purpose
f. Determination of how to use information for purpose desired

Utilizing this structured model will allow the instructor to consider manufacturing as a huge data bank. The information so arranged will be compatible with general curriculum development models, categorically. The end result will be generation of a student-oriented information system tailored to their interests.

The same comprehensive model can be utilized in the preparation phase as well. The phasing and terminology changes as the model applies more to specific knowledge and skill acquisition. However, it is structured in a manner that is compatible with the exploration categories and content. The preparation model is as follows:

SPECIFIC MODEL

a. Selection of occupation or job or job family (from exploration phase)

b. Interpretation of function, process or product specifications/requirements

c. Assessing or measuring the performance, activity or product

d. Comparing specification and measurement

e. Determination of conformance

f. Compiling-recording information

g. Determination of disposition

INSTRUCTION METHODOLOGY

Basically, there are two methods useful for conducting exploration and preparation activities relative to careers, occupations and jobs contained in manufacturing. The first is a systems-oriented approach and is particularly useful in general and abstract interrogation of manufacturing. This approach initially is quite useful in helping students find areas they might wish to explore and to determine their interests and qualifications. The second approach is a discrete-oriented approach and is particularly useful to complement understanding of the occupation or job gained from previous exploration activities, and to consider, in detail, the specific job-related skills and knowledges.

SYSTEMS-ORIENTED

Reference is made to the Structure of Manufacturing, figure 2, page 16. As structured, manufacturing is comprised of three major elements, namely, functions, processes and products. The primary viewpoint to be taken is that Manufacturing Enterprise is to be interrogated, explored and understood as a whole (manufacturing) and explained in terms of its parts (functions, processes and products). In this manner, it is possible to integrate present courses and to construct related curricula which considers a cause effect relationship. This brings out information of the nature:

1. How do I contribute to the political, economic, technological and sociological facets of manufacturing (given an assumed occupation)?

2. What does my job-performance in that environment do to me in my other life roles (status, groups, health, family life)?

3. If I don't perform my job-tasks well or properly, what does this mean and/or do to the system?

4. What related skills, knowledges and attitudes are necessary for me to obtain--besides the specific job related skills and knowledges--so that I can perform successfully?

5. What should manufacturing do for me in order to maximize both our positions and futures?

These type questions and the information they generate are not mundane nor non-applicable. There is real understanding of some manufacturing along these lines. Society blames something called manufacturing for many ills and influences. Yet manufacturing, as such, is not all problems and ills. People create

manufacturing at all levels and to blame buildings, equipment is not logical. Also, such a line of questioning-interrogation leads to deprecation of people-worker activities.

It seems that a systems-oriented approach would be beneficial in examining major areas of concern which affect the school system-Manufacturing Enterprise, such as:

1. The compatibility of industrial wants and needs with student-school system wants and needs.

2. Timeliness of these interactions and processes, i.e.--future forecasts for type workers, when and how many.

Also, a systems-oriented approach when used at program inception, with full consortia participation, will help identify and focus on questions of the nature:

1. What is the proper role of the Manufacturing Enterprise and school system in such a program?

2. Who should instruct knowledge and skills programs?

3. If an integrated program occurs, will there be conflict between educational, industrial and/or union contracts? Who will handle this?

As can be seen, a systems-oriented approach is useful, especially in exploration activities. This raises many questions and provides the maximum opportunity for exposure to the Manufacturing Enterprise in its totality. In the past, this information was taught as job-related, either during the standard apprenticeship, vocational or industrial education programs, or acquired, slowly, on the job. This type and kind of information should be presented before-the-fact as an aid to screening-selection activities during the exploration phase. Later, the same information, tailored to a job or occupation, can be reinforced at the specific job level as related information and as an aid for rediction and/or advancement purposes.

SPECIFIC

The job analysis approach is one which is in evidence in most apprenticeship, vocational and industrial education programs. The approach used is to assume that the parts (jobs, occupations) are necessary when acquisitions of known or forecasted occupational profiles is required. They are typified as they appear in the Dictionary of Occupational Titles and Employment Outlook Handbook.* Concentration of education and training is accomplished at the job-task level, then to a job-family (tasks) level and upward

* Ibid.

through occupational levels, ever expanding. Curricula can be quickly generated by reference to job descriptions-duties; General Educational Development; specific vocational preparation; equipment/tools used; and, conditions of employment. The main difference between the systems-oriented and specific approaches is one of education versus training emphasis. Systems-orientation is education in the sense of having near future applicability. Discrete-orientation is training in the sense of having specific and immediate applicability.

The systems-oriented approach is a more difficult instructional model to use and demands many external resources for implementation. Also, the student benefits may not be immediately evident for purposes of measurement or evaluation. A school system would have to extend and/or rearrange itself in order to accomplish such a program.

The discrete-approach is relatively well proven but has limitations built into it. Manufacturing Enterprise career, occupations and job fields can be taught using both approaches. The selection of the method(s) will be a function of the school system and its supportive consortia.

GENERALIZED CURRICULUM DEVELOPMENT MODEL

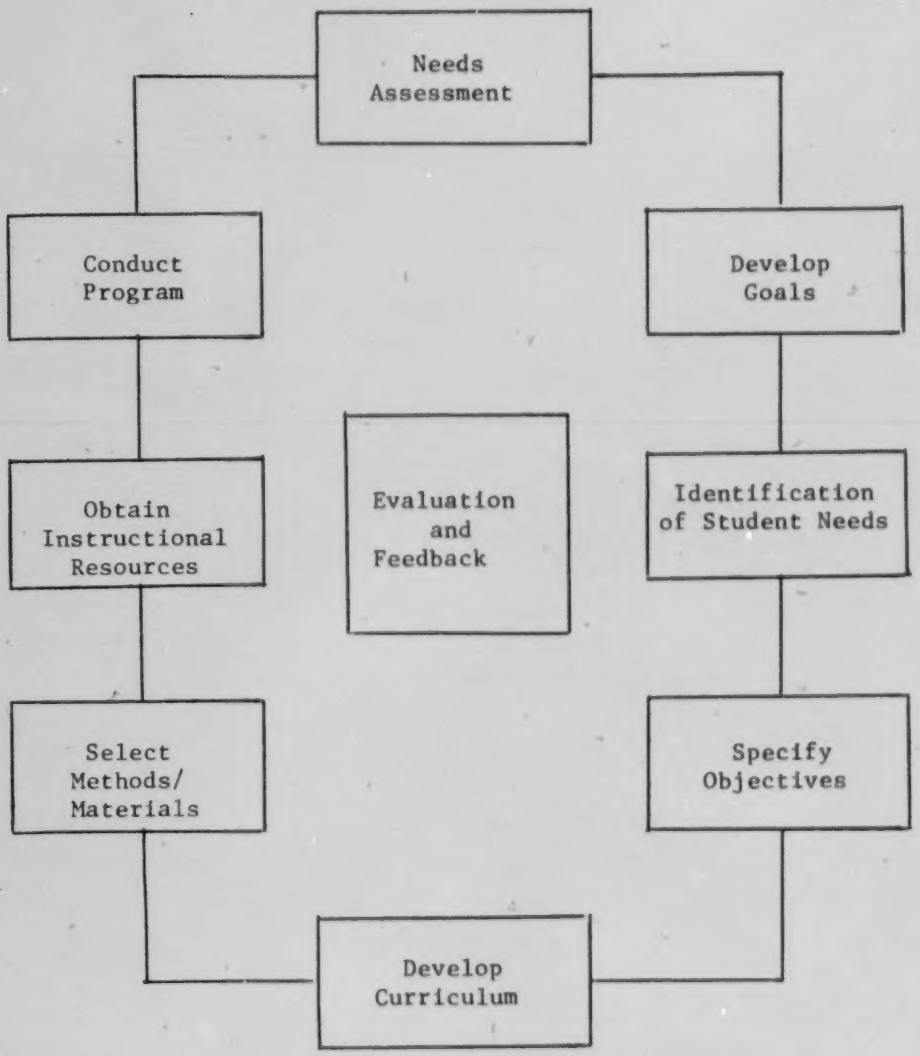
The Generalized Curriculum Development Model recommended for use in support of both exploration and preparation activities in manufacturing occupations is shown in Figure 3, page 27. The elements comprising the model are:

1. Needs Assessment. This is an assessment of the combined needs of the student, the sending institution (school) and receiving institution (the Manufacturing Enterprise). If a job were the need, industry would specify the profile needed/wanted; the school system would concur and agree to develop a program to meet the industrial profile; and, a student would agree and enter into such a program.

2. Develop Goals. This element specifies what knowledges, skills and attitudes are required (job description) to meet the need and not now possessed by the student.

3. Identification of Student Needs. This element identifies what the student knows and does not know about the skills, knowledges and attitudes of the job to be educated and trained for as determined in elements 1 and 2.

Figure 3 - GENERALIZED CURRICULUM DEVELOPMENT MODEL



GENERALIZED CURRICULUM DEVELOPMENT MODEL

4. Specify Objectives. From element 3, a listing of skills, knowledges and attitudinal factors which must/ should be learned--in support of what the student already knows--is made.

5. Develop Curriculum. Curriculum is developed to accomplish the specific objectives derived in element 4.

6. Select Methods/Materials. This is a follow-on component to element 5 and is designed in conjunction with curriculum development. Limitations such as media/ materials availability, and cost, will affect element 5 above and possibly necessitate restructuring of curricula.

7. Obtain Instructional Resources. This is a natural concommitant to elements 5 and 6. In the case of exploration or preparation activities in manufacturing occupations, the instructional resources may be from industry, unions, or other related areas. When such is the case, timing will be a consideration in securing these resources.

8. Conduct Program. This is the resultant of all the foregoing elements.

9. Evaluation and Feedback. This element is not an end product only. In each element predescribed--as it is being formed--evaluation and feedback should occur. This element serves as the change agent and modifier for each element as it attempts to answer the need. After program conduct, evaluation and feedback from all involved parties should occur in order to obtain information which will make the program better in the next session held.

UTILIZING AN EXEMPLARY PROGRAM AS THE LEARNING VEHICLE

INTRODUCTION

Manufacturing Enterprise content cannot be studied in its entirety nor learned even if one could live several lives. But exploration in secondary school can be accomplished.

One way of accomplishing maximum exposure to typical manufacturing scope is by use of an exemplary program. The criteria for selection of an exemplary program are:

1. The exemplary program should encompass a wide span of career and occupational fields.

2. The career-occupational fields should have high visibility in the school system area.

3. The instructional and material resources should be locally available and be easily/inexpensively obtained.

4. The exemplary program industry should be nearby--in part, if not in its entirety.

ADVANTAGES

The advantages of using an exemplary program are many. The following are some of the advantages:

1. The scope and depth of the program can be made understandable.

2. Curriculum development effort is eased by utilizing much of what is locally available and related.

3. Much information about the selected exemplary program industry is already generally known by the school-student and consortia system.

4. Change information can be handled rapidly and specifically.

5. Counseling/guidance information, job-related information and access to specific resource personnel is immediately available.

DISADVANTAGES

When a systems-oriented enterprise is examined through one of its elements, some disadvantages occur. These are, typically:

1. A tendency to draw conclusions about the whole enterprise from one of its parts.

2. The customs/culture, values and related criteria inherent in the exemplary program are taken as being similar to other manufacturing enterprise elements, which may not be true.

3. Many interesting careers and occupations will not be discussed, i.e., those in Aerospace versus those in the Foods Industry.

4. In given areas of the Nation, the views and emphasis given may not hold true for other communities.

5. There will be a tendency to overemphasize the importance of the exemplary program industrial contribution to the whole field as compared to the other contributing elements.

Mostly, the systems-oriented instructional approach is preferred on the basis of the above disadvantages. Yet, in order to have a quick-response and a specifically valid--at least for the community--program, the more discrete approach using an examplary program will seem more cost-beneficial to most school systems.

PROGRAM EVALUATION PARAMETERS

Program evaluation of both the exploration and preparation phase of activities in manufacturing occupations will depend on the criteria established by the school system developing and implementing this type program. The criteria should reflect the inputs of all consortia members in the school system program.

There appears to be difficulty in properly arriving at true and meaningful evaluation if feedback from Manufacturing Enterprise, the work force, related areas and the school system is examined. This becomes a problem in both the overall and specific program goals.

OVERALL EVALUATION

Because this type training and educational program is geared to career education, the first overall evaluation parameters must be concerned with career. At this time it seems both difficult and unfeasible to attempt an evaluation of career education. Career education is too comprehensive and the state-of-the-art in evaluation cannot approach a logic, proper or true format for understanding, predicting or controlling any or all of its facets. Therefore, career education, as a term, will best be evaluated in its operational format.

The remaining overall evaluation parameter poses a question, did this program do what it was supposed to? This can be immediately evaluated in discrete program stages, by both specific and summative objectives acquisition. However, the overall evaluation of the program is still difficult and rests with the goal of the student. Program evaluation, overall, will be a function of feedback from the student at a future point in time. When the student is in the preparation phase, feedback can be obtained about earlier exploration activities. When the students choose to either obtain a job or continue formal education, feedback can be obtained about both exploration and preparation relative to the choice made. At the present time, overall evaluation will be dependent on future student successes and recommendations are not made at this time to establish program evaluation techniques, information or methodology.

SPECIFIC EVALUATION

Specific evaluation is possible and warranted. The curriculum development elements aforementioned have specific criteria built in for use at this level of evaluation. In the discrete taxonomic sense, the descriptive career, occupation and job skills, knowledges and attitudes can be specified, taught/learned, tested and measured. The consortia member can evaluate these factors by the same standards and values that formed the criteria, initially. In this sense, specific evaluation is a closed-loop system. The program could be successful in the occupational-career sense, with the student meeting requirements and goals, but, personal problems may occur in the future such as:

1. The student went to work and found that he/she did not like the job and changed jobs or quit.

2. The student went to work in another part of the country, upsetting his family.

3. The student during, or at the end of the school program, rejected particular occupational-career fields and had no time left for recovery due to age and time-phased school program ending or causing him/her to have to graduate.

Evaluation of career-oriented programs may be very difficult overall, and could be quite tenuous at the specific level.

Evaluation of career and occupational oriented programs should be approached with caution. This is a guide, not a program. Attention to the parameters of career and occupational education programs should be viewed as goal-oriented more than objectives oriented. Whether the more readily measured and evaluated specific objectives add positively towards forming a career choice is not known. It is beyond the scope of this guide to recommend, select or determine evaluation criterial attributes or parameters.

GUIDELINES FOR DEVELOPMENT AND CONDUCT OF A TYPICAL EXPLORATION PROGRAM IN MANUFACTURING

INTRODUCTION

The following section contains a typical exploration program in selected manufacturing industry occupations. The program example selected is based upon the food and kindred products industry. The other areas can be taught in a similar manner. Time and space constraints do not permit detailed guidelines for all areas. The food and kindred products industry was chosen as the vehicle-program because it meets the criteria for establishing an example program in nearly all parts of the United States, namely:

1. It encompasses a wide career and occupational field span;

2. The career and occupations are highly visible in the community;

3. The instructional materials/media and resources are available, locally; and,

4. The industry, in part or whole, will be nearby.

Program design and its conduct is a matter to be determined by the school system. A program to explore any occupational field could be very short and specific or open ended. The program could explore one job or occupational family or a series of families or careers. The constraints and limitations on program design, mentioned previously, plus whether this program is to be considered to be: (1) an add-on program; (2) an in-place of program; or, (3) an integrated program will determine the design and conduct parameters.

The example program is structured into units:

1. Industry and society
2. Marketing
3. Food industry work force
4. Quality assurance careers
5. Roles and skills
6. Employment patterns
7. The real world

In each section, both discrete and general exploration activities can be attempted depending on the constraints at work. The guidelines are established to provide springboards from which to enter into both the locally specified area as well as the directly and indirectly related peripheral areas.

GENERAL GUIDELINES

The guidelines suggested in this section for a Manufacturing Career Exploration program, in the Foods and Kindred Products Industry, represent just one approach that an instructor might use. The suggested procedure for all areas are Food and Kindred Products as an example. In a similarly designed individual instructional system, the instructor is more manager than instructor and it is toward this that the instructor must work.

An instructional system is individualized when:

1. The personality and capabilities of each student play a major role in the selection of objectives, sequence of study, choice of materials, and procedures followed.

2. The time spent by each student on a given objective or activity is determined by performance rather than by the clock.

3. The progress of each student is measured by comparing performance with specific objectives rather than with the performance of other students.

The first problem is to determine what level students are in their manufacturing careers program. There are four categories of entering students:

Category I: They have been introduced to awareness orientation activities and are ready to begin exploration.

Category II: They have been introduced to awareness orientation activities and have begun some Career Exploration on their own.

Category III: They have been introduced to awareness orientation activities but are inadequately prepared for exploration.

Category IV: They have never had instruction to manufacturing careers at any level of endeavor.

The time required for the completion of the manufacturing career exploration program, different for each student, is determined by such factors as the student's interest, the number of jobs and job families studied, the number of occupational groups explored, and the degree or depth of involvement with any or all of these.

MANUFACTURING CAREER EXPLORATION ACTIVITIES

Some suggested activities in preparing the students for exploration in manufacturing would encompass the following:

Pre-test students to determine what they know about manufacturing; examine and explain all objectives to students; review possible activities to attain these objectives; encourage students to begin making decisions as to their objectives. (Activities selected from the occupational group being explored, will be matched with the objectives of this plan. This will constitute the student's "Plan of Exploration".)

Review and discuss results of pre-test with students. Be candid in a positive way and impress upon students the importance of their sincere efforts. Review the activities the students have chosen and begin the necessary preparation for undertaking them. Have the students begin writing letters and setting up appointments.

Provide activities for those students who have inadequately completed awareness and orientation activities. From the lists of materials and activities, the teacher should be able to make constructive efforts in this direction. Assign several students the weekly task of clipping newspaper articles on manufacturing, as well as finding related magazine stories.

Arrange visits and appointments as a result of the responses which the students receive to their letters and calls. A large calendar could be used. The order of the rest of the program for exploration can be varied to satisfy student needs and scheduling problems.

Exploration is the key word because the student must feel free to examine, sample, test, question, and, in short, explore. As manufacturing is explored, the students will learn, perhaps for the first time, what an important role exploration plays in satisfying human needs. Also, the instructor will learn that a relevant instructional program can solve many disciplinary and motivational problems.

GOALS OF PRIOR CAREER EXPLORATION

Upon completion of the career awareness and career orientation programs, the student will have:

1. Developed a positive attitude about the economic, technical, political and social significance of the manufacturing industry.

2. Developed a considerable degree of self-awareness and understanding about attitudes, skills, knowledges, interests, talents and self-concepts related to jobs in the manufacturing industry.

3. Developed an expanded occupational awareness, through participation in a variety of specific career development activities; an understanding of the interdependency of occupations; and, the need to relate to and cooperate with others in the world-of-work.

4. Improved personal overall performance by participation in a unified, action-centered, career-related curriculum.

The student's status in the program can be determined by: pre versus post testing; personal interview; multiple-choice questionnaire; or, open-ended survey. The exploratory student might be asked such questions as:

1. Why is the manufacturing industry important?

2. Why is the manufacturing industry important to you?

3. What kind of job in manufacturing are you considering at this time? How do you obtain that type job?

4. If you obtain such a job, who will your fellow workers be? Who will give you directions? Will you give direction to others? What will your job contribute to the manufacturing industry? How will it help the country as a whole?

5. Has your study of the manufacturing industry helped you in school subjects? If so, which ones and how? If not, how do you think that it could have?

PROGRAM OBJECTIVES (GENERAL)

In Career Exploration, the students should explore broad clusters of occupational groups, jobs/job families, and individual tasks and responsibilities, thus increasing their understanding of

manufacturing through concrete experience. The students will be able to evaluate their own interests, abilities, values and needs in relation to occupational goals. The student will also have the opportunity for more detailed examination of selected occupational areas. In the academic areas related to manufacturing, an overall improvement in performance would be expected. This exploration will provide at least one occupational area in which the student can work toward developing job entry skills and appropriate further educational experiences.

STUDENT GOALS (PROJECTED)

After a program in Career Exploration, the students should have:

1. Developed a knowledge of the manufacturing industry and its relation to the entire world-of-work, including both the knowledge of the industries themselves as well as the contributions of the industries to the prosperity and success of this country as a whole.

2. Developed awareness of, and respect for, the men and women employed in manufacturing occupations.

3. Developed skills in test-taking and self-analysis in order to be more precise in finding themselves in the manufacturing industry; to provide them with a profile of their interests, attitudes, and aptitudes; and, to help them relate to the jobs/job families they chose to explore.

4. Reviewed the major occupational groups in manufacturing relative to their own interests, attitudes, and aptitudes and narrowed exploration-selection interrelationships.

5. Gained a knowledge of career ladders, changing employment patterns, and future growth predictions in the occupational groups chosen for exploration.

6. Determined the future education and/or training necessary for entry-level positions in the jobs/job families chosen for exploration.

7. Developed a knowledge of such important problems and issues occurring in manufacturing such as: labor-management relations; equal employment opportunity programs; and, community relations.

INSTRUCTOR NOTES

Instructor notes and curriculum development guidelines are provided in both generalized and semi-specific form. These can be utilized as a framework for use in the further (and more specific) curriculum to be developed.

Basically, the sequence of the exemplary program proceeds from the general to the specific. Manufacturing functions, processes and products are overviewed; the relationships of the selected sub-function of quality assurance to the overall functions contained in manufacturing are examined; the specific career fields within quality assurance are examined; and, the specific work activities contained within the various quality assurance oriented careers and occupations are examined.

The curriculum is developed and directed using behavioral objectives as a base. The specific objectives are not developed in detail. This is an Instructor's Guide and not a course of instruction.

As a general guideline for the actual course of instruction and in order to provide better evaluation data, the following general curriculum development guidelines are suggested for use in the subsequent curriculum development activities.

GENERAL CURRICULUM DEVELOPMENT GUIDELINES

1. The students should be aware of their present level of behavior relative to career education objectives (pertaining to exploration and/or preparation in a chosen career field).

2. The students should be made aware of the behavior skills they will learn and what they mean.

3. Students must be motivated by external and internal means for acquisition of the behavioral characteristics inherent in selected career and/or occupations.

4. The students must have the proper media and materials available in a progressive sequence. These materials should have maximum relation to the career field/occupation chosen.

5. The student must have the opportunity to learn and practice the behaviors contained within the career/occupation. This opportunity may be contained in a school system classroom or laboratory. However, it may have to take the form of external trips, working/practicing on-the-job and/or direct contact with people actually working in, or who perform, that occupation.

6. The students must have a means of self-evaluating their learning-experience. This can take the form of a self-test, and/or instructor, counselor or other resource personnel appraisals, interviews, and assessments.

7. The student and instructor must have a means of evaluation which reflects the student's progress using applicable standards or norms. This information is to be considered as feedback to the student for internal purposes of reinforcement and/or additional changes which may be required. The instructor should use this information as being applicable to making those changes or amendments necessary to the management of the learning experience. Normally, a pre-test and post-test are useful for those purposes concerned with specific objective learning.

8. The objectives to be attained should be written in a manner which are compatible with expected student performance.

9. The objectives so written should be measurable by one, some, or all of the senses.

10. The objectives should be as specific as possible in order to promote relevance and cumulative learning.

11. The specific objectives should be written in a manner which helps relate to the major or overall objective or goal.

12. The measurement of student performance in the learning experience must take into consideration the environment within which the performance takes place as well as specifying the level considered satisfactory.

13. The learning objectives, if time based, must provide for variance in student's capability for attainment. Usually, these time-based objectives are written for an average student's performance range. The differences in over or under performance will have to be a matter for instructor-student interpretation.

It should be noted that during exploration, the use of specific objective oriented knowledge and skill acquisitions is more difficult to determine than in the case of acquiring a specific skill such as typing. The acquisition of knowledges, skills and attitudes at the exploration level are more general and obtuse than might be desired for purposes of evaluation. Therefore, while the above guidelines are highly useful for some aspects of curriculum activities, instructor interpretation will be crucial during this phase to reprogram based on student assessments.

EXPLORATION PROGRAM IN THE FOOD AND KINDRED PRODUCTS INDUSTRY OCCUPATIONAL FIELDS

INDUSTRY AND SOCIETY

PURPOSE

The purpose of this topic is to provide awareness and understanding of how and what the Food and Kindred Products industry contributes to society. The most immediate way to gain such awareness is to make inquiries within the home, school or community and gather data on where and how products from the industry are used, and what effect use of these products have on individuals.

Overall, this topic should provide a general awareness of the Food and Kindred Products industry and the kind of roles that this industry plays in society.

DESIGN

This topic is designed with the idea that a basic awareness of an industry and how it relates to society is essential to any subsequent investigation of the internal and external work environment. The reason for focusing on this selected industry is to reduce the complexity of handling the scope of the entire field of manufacturing.

SKILLS

The design of this topic has incorporated opportunities for learner practice in and acquisition of basic skills such as reading, writing, inquiry skills, reporting and decision-making skills. Inter-personal skills can be exercised/acquired if tasks are assigned as team or group efforts.

OBJECTIVE

As a result of exploration activities contained within this topic, the learner should be familiar with various ways in which the Food and Kindred Products industry contributes to society.

INTRODUCTION

Prior to beginning the topic, the instructor should give a general introduction explaining what the following topics are about. A part of this introduction should include a general discussion of what manufacturing is and how it is being defined

in this Guide since learners will encounter at least some of the terminology in their exploration activities. In doing this, the introductory and background information on manufacturing provided in the Guide will be of great help in examining manufacturing. Also, the students should be familiar with the Food and Kindred Products section and general sections in their Manuals.

INSTRUCTIONAL RESOURCES

Food and Kindred Products background material contained in the Instructor's Guide and Student Manual.

EVALUATION PROCEDURE

It is suggested that instructors use whatever informal method they wish to assess learner knowledge of this background information. Generally students should know what the Food and Kindred Products industries are, what kinds of things they produce and how their efforts, activities and existence effect and contribute to our lives (society).

The students should be able to relate growth of the food industry paralleled by societal growth and changes. The instructor should check to see that the learners have done this assignment by reviewing the monitoring sheets and class data summary.

Learners should submit a report which identifies the basic nutritional needs, why each is a need, and how the school cafeteria and/or home plans for meeting each need. These reports should be reviewed in light of general nutritional guides to insure that learners have gained an accurate understanding of nutrition and how the cafeteria staff or home accounts for nutritional needs.

Willis, Paul S., The Food Processing Industry, in Encyclopedia of Careers and Vocational Guidance (William Hopke, Editor) 1967. Selected readings on contribution of food industry and its relationship to society.

Any encyclopedia will have a selection on nutrition. United States Department of Agriculture - Food and Nutrition.

1. Key nutrients (0003);

2. Food needs of family members (0002). Cereal Institute, Inc. "Cereals: A Food For Today".

Sugar Institute: More Facts on Good Nutrition. Food value charts with 12 worksheets per set may be obtained from American Meat Institute (AMA approved 8¢ per set)

TEACHING ACTIVITIES

1. The instructor can present general information about the Food and Kindred Products industries, and/or, the learners can be asked to discover this information for themselves. This can include:

   Basic Food Families
   How Agriculture Relates to the Food Industry
   What is Food and How Classified?
   Importance to Society
   What is the Role of the Various Governments Related to the Food Industry?

2. As a first awareness, the instructor can have the learners design a form (or use the one attached, page 43) for assessing usage of Food and Kindred Products in their home/school community. The type and characteristics of this assessment should be defined by the instructor and learners but, in general, the assessment should cover several categories or types of products used or uses of products or both (e.g. the consumption of various categories of food in the home over a specified period of time). The learners can summarize their data for the entire class and identify the most frequently consumed or used items. This summary can be put aside for use with the next topic which covers marketing as an industry activity.

3. As another initial awareness experience to discover how the Food and Kindred Products industries effect and contributes to society, the learners could consult with the school nurse, dietitian or science teacher to identify the minimum daily requirements of a normal balanced diet. Then the cafeteria manager can be interviewed regarding the purchasing, preparing, and preserving of school food stuffs to meet the requirements identified above. For each basic nutritional need, learners can identify the need and describe how the cafeteria plans for and meets those needs. The learners should also attempt to discover why each of these needs exists (e.g. how and which government agencies research and establish nutritional needs for individuals).

NAME: _____

FOOD & KINDRED PRODUCTS: PRODUCT/USE CONSUMPTION MONITORING CHART

Where, what and how are you monitoring (write a brief description): _____

	DAY #1	DAY #2	DAY #3	DAY #4	SUMMARY
DAIRY					
MEAT					
FISH					
VEGETABLE					
FRUIT					

MARKETING

PURPOSE

The purpose of this topic is to familiarize learners with the basic marketing tasks, techniques, and practices of industry relative to developing new products, improving existing products and distributing products to consumers. By examining marketing, a better understanding and awareness of how the Food and Kindred Products industries rely on other segments (clusters) of the work world will result. Examples of this reliance are the distribution of products (transportation), need for new products (agri-business).

Overall, learners should come away with an awareness of how a product is marketed and how it became a product in the first place. Once this has occurred, they can then begin to explore who does what relative to production of a product.

DESIGN

The design of this topic reflects the idea that learners should have the opportunity to actually experience activities rather than simply talking about or hearing about them. Learners are encouraged to participate actively in planning, conducting and reporting on tasks in such a way that they gain insight and understanding about manufacturing and the general marketing component of industrial enterprise.

SKILLS

Learners are provided with opportunities for practice of interpersonal skills, communication skills (oral and written) and research skills as they are applied in the work world.

OBJECTIVE

Learners will gain a basic understanding of marketing and the methods through which consumers are surveyed and how that influences industrial production.

INTRODUCTION

Learners should have at least basic background information on the economic forces and social forces which create the need for various products. The instructor should arrange for learners to be given a general overview in these areas including a perspective on the marketing component of industry. This may be done by the instructor or through a guest lecture given by other members of the school staff. Another way to accomplish this would be to have

a speaker from industry come into the classroom and make a presentation. Whatever the strategy employed, learners should have a basic understanding of the law of supply and demand, what it is and how industry effects and is affected by it. They should also be aware of the role the consumer plays relative to industry policies and operations. When the instructor is satisfied that learners have gained this basic understanding the following activities provide very direct, concrete experiences relative to some of the specific marketing activities and practices of industry.

INSTRUCTIONAL RESOURCES

Magazines, newspapers, or possibly a radio or TV so the class can watch or hear a commercial and discuss it immediately.

Guest lecturer from an ad agency or ad department of any industry.

An Introduction to American Industry; DCA Educational Products, Inc., Philadelphia, Pa.

World of Manufacturing; McKnight and McKnight; Bloomingdale, Illinois.

The Last Word; 16mm film; Association Sterling Films. (free loan)

EVALUATION PROCEDURE

The instructor should insure that learners are participating in the discussion and that the learners can identify the characteristics of an ad or commerical based on the set of discussion questions provided. As an exercise the instructor may wish to show the students an ad and have them respond to selected categories of activities listed under Learning Activities.

The instructor should observe how the groups are functioning relative to completing their tasks. Severe interpersonal problems should be noted and discussed with group members. In order to assess the work the group has done the instructor should review the progress of the group frequently and should review the final report submitted by the group. The instructor should be sensitive to such areas as the accuracy of reports, the validity of the methods used, the completeness of the task and so forth.

TEACHING ACTIVITIES

One of the most visible and common aspects of marketing is advertising. Industries are very concerned that consumers buy their products and advertising is a principle means of convincing

the consumer that they should try and use a product. Learners should be aware of the importance of advertising. Learners can locate several examples of advertisements or commericals about various food products and then, in class, the learners can discuss the characteristics of these ads. Questions like the following should facilitate discussion:

1. What is the setting in which the product is presented?

    a. Physical surroundings.
    b. People
    c. Music/color or other background device.

2. Is there a known person(s) involved?

3. What benefits are involved by use of the product?

4. Overall, what is the general impact intended?

    a. Psychological
    b. Social

5. What or who is the intended audience for the ad and product? (i.e. adults, children.)

6. How do you know if ads/commercials are successful?

7. Does the ad/commercial promote a product or a company? (Del Monte ads, for example, promote the company)

8. How honest is the ad?

9. Is there some catchy twist, or slogan or other device?

10. Who designs advertising media?

Another activity engaged in by the marketing component of industry is studying consumer markets. This falls under the general heading of "market research." Generally there are three types of studies: (1) Survey; (2) Historical; and (3) Experimental. This activity calls for the cooperation of food stores in the community. The class can be broken into three groups each assigned to try one of the types of studies listed below.

GROUP 1: SURVEY: Have the group identify some new product (food) that has appeared on the market. The group may wish to try more than one strategy for conducting the survey. Have the group design and develop the instruments to be used, and develop the methods and strategies for conducting a telephone, personal interview, and mail

survey. When they have completed the surveys, have them organize and analyze the data and prepare a report to be presented to the class. (Note: This would provide an excellent opportunity for learners to receive instruction and practice in reporting writing.)

GROUP 2: HISTORICAL: Have the group identify two stores which serve different populations of people. Select a product (or several) and for each store research through store records, the sales of that product(s). The group should prepare a report which describes the characteristics of the customer populations, the products selected (and why) and the findings of their research.

GROUP 3: EXPERIMENTAL: Have the group obtain the cooperation of two stores serving similar populations. Have the learners design two kinds of ad plans. (e.g. window only/shelf only) and monitor sales of items. They should draw conclusions based on their findings and make a report to the class.

FOOD INDUSTRY WORK FORCE

PURPOSE

The purpose of this topic is to introduce to learners the classification system developed and used for categorization of the work force in any of the industrial enterprises in the Manufacturing Cluster. This system provides a useful framework for exploration of manufacturing because it facilitates identification and definition of general functions and also provides a simplified system for exploring the general relationships between the functions. It is essential that learners achieve this general level of understanding prior to providing more in-depth exploration activities in which learners focus on specific occupational groups.

DESIGN

This topic is designed to provide a basic understanding of how the work force of any industrial enterprise can be classified. A further feature of the design is that this topic serves as a framework from which more detailed exploration of occupational groups can result. The design further calls for the preparation of learners, by Pupil Service and Guidance Personnel, in the area of inquiry into occupations (research, analysis, etc.).

One crucial element of this topic is the introduction of the general cycle employed in decision making which is presented in the Generalized Curriculum Development Model, Figure 3, page 27.

Decision making is an important skill area in the world of work and learners should be familiar with the steps workers follow in making decisions.

SKILLS

Opportunity is provided for practice of communication skills (oral/written), basic inquiry skills (research/analysis) and decision making. It is expected that learners will also be increasing their skills relative to exploration of the real world of work within the Manufacturing Cluster.

INTRODUCTION

The topic should be introduced with an overview of the classification system developed in Figure 4, page 52. This system is used to identify the four main functions and the associated subfunctions. These subfunctions are made up of occupational groups which will be looked at in some depth in later topics. Learners should also be told that they are going to examine these four functions in general terms as well as the subfunctions.

They should also be told that emphasis will be placed on the Inspection and Test subfunction in order to discover and examine the general method used in decision making by persons involved in this subfunction. They are also going to look at this method in discovering how to make a decision, generally, as well as how it is used by various segments of the work force, such as inspection and test.

The learners should also be told that at the conclusion of this topic they will learn some training in techniques and strategies appropriate for in-depth exploration of subfunctions and occupational groups. The instructor should emphasize the importance of exploring the work world for purpose of understanding and, ultimately, for making more realistic personal career decisions.

INSTRUCTIONAL RESOURCES

The STRUCTURE OF MANUFACTURING MODEL, Figure 2, page 16.

DICTIONARY OF OCCUPATIONAL TITLES, Vol. III, Department of Labor, Washington, D.C.

DCA Educational Products, Inc.; An Introduction to American Industry.

Career Occupational Fields and Job Families Within Manufacturing Enterprise; see Figure 4, page 52 in this Guide.

Hopke, William, Editor, Encyclopedia Of Careers And Vocational Guidance. 1967.

EVALUATION PROCEDURE

The instructor should insure that learners have compiled useful definitions for each of the functions. The learners should review their definitions to insure that they can answer the following questions:

1. Name the functions.
2. What are the general work activities of persons in each of the functions?
3. What are the responsibilities inherent in each of the functions?
4. In general terms what are some of the important relationships between the functions?

The instructor can use these questions to conduct a short review of the function definitions to insure that the learners do know the definitions of each.

The instructor should insure that learners have compiled useful definitions for each of the subfunctions. The learners should review their definitions to insure that they can answer the following questions:

1. Name the subfunctions by function.
2. What are the general work activities of persons in each of the subfunctions?
3. What are the responsibilities inherent in each of the subfunctions?
4. In general terms what are some of the important relationships between the subfunctions?

The instructor can use these questions to conduct a short review of the subfunction definitions to insure that the learners do know the definitions of each.

TEACHING ACTIVITIES

The instructor should conduct a general discussion about classification systems and the identified functions. (Reference should be made to Figure 4, page 52.) The learners should attempt to develop some general definitions for each of the functions--

What are they? What do they do? When they have done this, the learners should make a quick check of appropriate resources and compare the class developed definition against those described in the prepared materials. Learners should use a work sheet to do this. Further discussion should involve a comparison of the two definitions and learners should discuss what these differences represent relative to things they did not know or were not aware of.

Once the functions are defined, class attention should be directed to the major elements of each function, subfunctions. Learners can refer to various resources (or review films, filmstrips, etc.) to gain a basic understanding of what each of the subfunction roles and responsibilities is within the industry. This activity is intended to give only an overview of the subfunctions and should not be time consuming. The subfunction definitions should be recorded on a work sheet.

The instructor should summarize these activities by discussing with learners the importance of decision making in any of the functions. In order to fulfill roles and meet their responsibilities, people in each of these functions (subfunctions) must constantly make decisions. If production is to be efficient and the resulting product is to be satisfactory, the decisions made must be of a high quality. One segment of the industrial work force concerned with these are those people from the "Quality Assurance" (Engineering) and "Inspection and Test" (Factory) subfunctions. After a review of the steps involved in decision making, an examination of those subfunctions since each in one way or another is concerned about and involved with decision making.

INSTRUCTIONAL RESOURCES

1. Generalized Curriculum Development Model, Figure 3, page 27.

2. The Structure Of Manufacturing, Figure 2, page 16.

3. Job descriptions which address general decision making; those can be from government, industry, filmstrips, films, etc.

4. Guest speakers from industry who can discuss decision making.

5. Various prepared materials on decision making (e.g. College Entrance Examination Board, Deciding).

6. Handbook For Analyzing Jobs, U.S. Department of Labor, GPO. 1972.

EVALUATION PROCEDURES

The instructor should insure that the learners are aware of:

1. Reasons that decision making is important in industry.
2. Things about which decisions are made.
3. The seven steps in the decision making cycle.
4. The kinds of information needed to make decisions about careers.
5. The kinds of strategies and techniques used in gathering information.

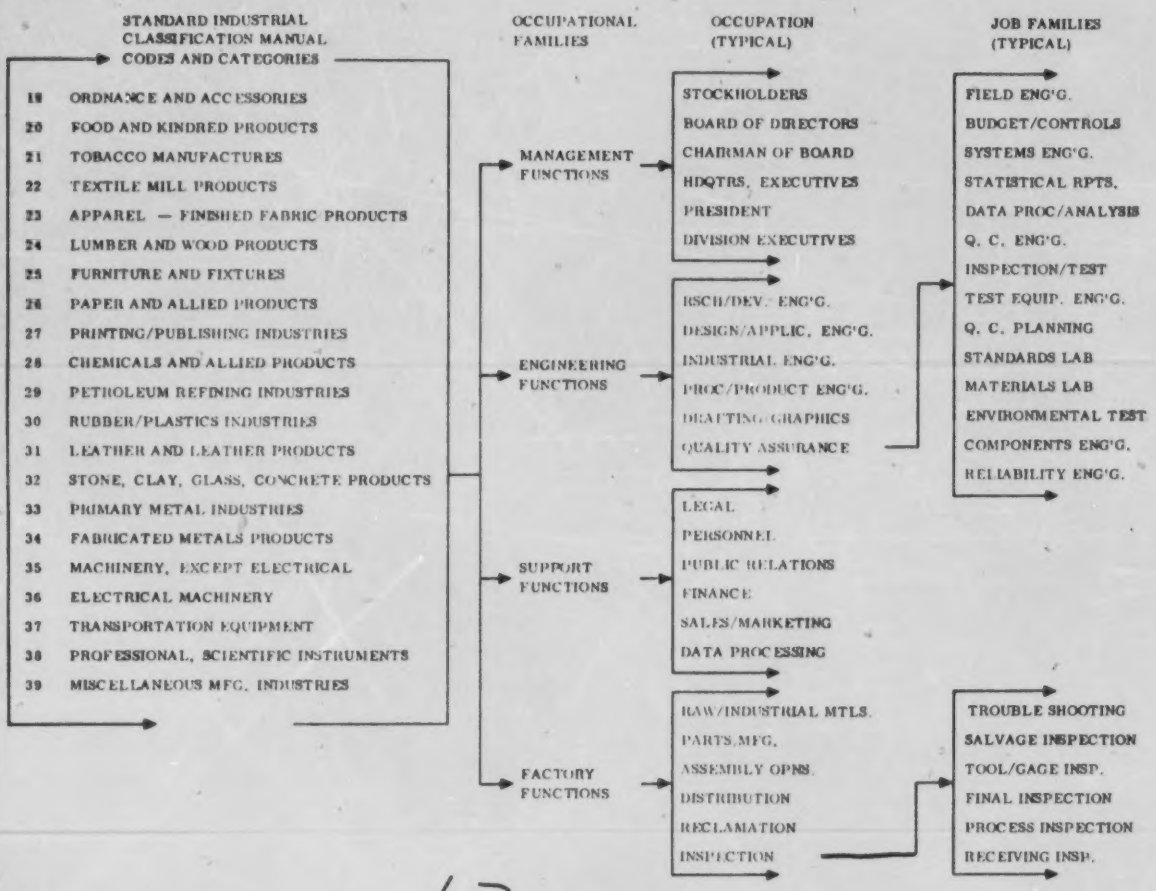
The instructor can conduct a brief review session to assess learner awareness of the above.

This activity calls for learners to review the decision making cycles presented in the Generalized Curriculum Development Model, Figure 3, page 27. The seven steps identified in this Model are the steps involved in any decision making activity.

NOTE: The reason for emphasizing the decision making cycle under the Inspection and Test and Quality Assurance subfunctions is based on the fact that the kinds of decisions made are very critical in terms of the process/product componenet of an industry. All other subfunctions are concerned about and/or affected by the decision made.

In general, decision making is important for a variety of reasons relating to plant location, new product development, contracting, production costs, process production efficiency, product quality. Inappropriate decisions or decisions made with inaccurate and incomplete information and data can prove very costly to the industry both in time and money not to mention reputation. To emphasize this the instructor may wish to have learners see a film or talk with industry people about importance of decision making. The learner should receive some preparatory instruction (probably from a counselor) in exploration and necessary information as a first step in decision making. (Learners will be making decisions at some future time.) The interrelationship between functions can be shown by use of this approach. The plans, policies, rules, standards and regulations emanating from management form the bases for the next level of departmental plans, policies and standards.

Figure 4 - CAREER OCCUPATIONAL FIELDS AND JOB FAMILIES WITHIN MANUFACTURING ENTERPRISE



The skills, knowledges, attitudes are similar in each of the functions/subfunctions. However, interpretation of these general plans, policies and standards help define the devision of labor. How does a general plan get to be a very specific blueprint? How does a process come to be formed and equipped? What knowledges and skills are divided by this general process of creating an industry? These type questions should be converted into learning modules.

FUNCTION: Duties, Responsibilities:

SUBFUNCTION: Duties, Responsibilities, Skills, Knowledges and Attitudes (occupations or job):

QUALITY ASSURANCE CAREERS

PURPOSE

The purpose of this topic is to examine the selected Quality Assurance subfunction and the careers, occupations and work-related activities contained therein. Also, this will allow maximum integration and utilization of content previously learned in Units 1, 2 and 3.

DESIGN

The design provides the student with an opportunity to develop self-awareness and plan for his future (in a gross sense) by the teaching and learning activities contained herein. The instructional objectives delineated specify the general goals to be attained.

SKILLS

The skills which should be acquired and/or reinforced are those general categories of: research and inquiry methods and procedures; communications skills (verbal and non-verbal); decision making and problem solving skills; and, evaluative skills. Also, depending on the particular work activity attained for exercise, the student will be able to experience certain cognitive and psychomotor skills of that work-related activity.

OBJECTIVE (GENERAL)

To provide students with the opportunity to become aware of how their career oriented self-awareness and identity can be further developed and realized through exploration activities of this as well as other selected career fields contained within formal manufacturing industries.

OBJECTIVES (SPECIFIC)

1. The students will be able to relate their inherent abilities, interests and attitudes to Quality Assurance careers contained within the structure of manufacturing.

2. The student will be able to understand the political, economic, technical, sociological and psychological aspects of this career field.

3. The students will be able to utilize decision making capabilities in the selection of this career or for other career fields that are compatible with their self-awareness and (future) self-identity.

4. The students will be able to use their self-awareness factors, as tempered by above objectives assimilation, to proceed (or reject and re-select) with exploration and beginning skills acquisition activities related to their selected career.

5. The student will be able to identify, a proposed course of further education and/or experiences necessary to the continuing pursuit of a career within the career field selected at some desired or indicated level.

PREREQUISITE OBJECTIVES

1. An understanding of what is meant by the concept Manufacturing.

2. An understanding of why manufacturing industries were formed.

3. An understanding of when manufacturing formed and grew in the United States.

4. An understanding of where manufacturing industries are concentrated.

5. An understanding of who the "workers" are in manufacturing industries.

6. An understanding of how the "workers" perform their activities within manufacturing industries.

7. An understanding of the concept Career.

8. An understanding of the concept Work.

NOTE: An excellent course vehicle for use in exploration and preparation for Careers in Manufacturing, which addresses the prerequisite objectives, is THE WORLD OF MANUFACTURING published by McKnight Publishing Co., Bloomington, Illinois.

INTRODUCTION

Prior to participation in the following described activities, the instructor and other support personnel should be familiar with the general description of the manufacturing model contained in the introductory chapter of this Guide.

The model contains many paths or ways by which to describe and explain Quality Assurance careers, occupations and work related activities. Already covered, in Units 1 and 2, are the marketing and industrial-society components of manufacturing. These could be examined for intersection with Quality Assurance. In this manner the integration of this subfunction (or any other to be explored) will be maximized.

TEACHING ACTIVITIES

OBJECTIVE 1

The students will be able to relate their inherent abilities, interests and attitudes to Quality Assurance Careers contained within the structure of food and kindred products industry.

ACTIVITY TO MEET OBJECTIVE 1:

After reviewing and/or overviewing prerequisite objectives, the instructor should overview Manufacturing Functions and discuss and explain work-activity knowledges, skills and attitude profiles of typical subfunctions and the people who work in these roles. The instructor will then be able to relate, by degree, what skills, knowledges and attitudes students already possess which can be built upon or used in this program. Also, the instructor can discuss the learning objectives at this point.

At this time, motivational factors will be a major consideration as they will determine individual student actions. The factors external to motivation, re: the environment and "command" situations, as well as the intrinsic factors of motivation (innate interest development), will have to be carefully watched and attended.

The instructor is asked to direct the inquiry about Careers and Manufacturing to the Quality Assurance subfunction career field within manufacturing. It is very necessary to delimit further exploratory education and experience to this careers area

as the example unit addresses only this segment of Careers in Manufacturing. This action should not preclude the instructor from talking, discussing or investigating other career fields.

LABORATORY OR WORK ACTIVITY

It is recommended that the students examine the various occupational profiles contained within the DOT and other references in order to determine the profiles of certain occupations in Quality Assurance or Inspection and test subfunctions listed in the Manufacturing Model. In the area of Quality Assurance, these titles will be typical:

Quality Assurance Manager
Quality Assurance Administrative Assistant
Quality Assurance Secretaries
Quality Assurance Clerk-Typist (Technical-Typist)
Reliability Engineers
Reliability Technician
Maintainability Engineer
Quality Control Engineer
Quality Control Technician
Quality Control Inspector
    Incoming Materials Inspector
    On-Line Inspector
    Performance Test Inspectors
    Final Test Inspectors
    Shipping Inspectors
    Salvage Inspectors
Quality Assurance Materials Engineer
Quality Assurance Materials Technician

The above titles and codifications can be found quickly in the DOT. It might be helpful herein to invite a state employment supervisor and/or industrial advisor to the classroom to help interrogate these occupations. The students should be able to work singularly or in groups in these profile determinations for some or any of these occupations. Each student or group should be able to list the general educational requirements for occupations; specific vocational preparation, aptitudes, interests, physical demands, environmental conditions and temperments.

INSTRUCTIONAL RESOURCES

Volume 1 - Dictionary Of Occupational Titles (DOT) Definition of titles.

Volume 2 - Dictionary Of Occupational Titles, Occupational Classifications.

Supplement 1 - A Supplement to the DOT.

Supplement 2 - A Supplement to the DOT.

Suffix Code Book - Suffix Codes for Jobs Defined in the DOT.

Training Manual - Programmed Training Manual for use with DOT.

Above complete set of Dictionary Of Occupational Titles is available from the Government Printing Office (GPO), Washington, D.C. Approximate cost $25.00.

Task Analysis Inventories - No. 2900-00163. Above available from GPO, approximate cost $2.50.

Teacher made (generalized) attitudes, knowledges and skills profile sheets. These could cover areas such as: Career aspired to; Level of education contemplated; Work preference (people, data, products); Environment; What skills now possessed?, etc.

Any of the above materials sets could be used singularly or in combination during this program. These will be useful in later activities concerning information acquisition, selection/rejection of career areas and/or future profiling of student development.

EVALUATION PROCEDURE

The student should be able to compare his own interests, aptitudes, skills, knowledges, environmental conditions desired, etc., with those of the occupations being studied. This is the first prerequisite to being able to make a career decision and might be termed data acquisition. Basically the student must know how to acquire types and kinds of data from identified resources.

OBJECTIVE 2

The student will be able to understand the political, economic, technical, sociological and psychological aspects of this career field.

ACTIVITY TO MEET OBJECTIVE 2:

Presentation. This lecture could assume the following posture and be applicable to all of manufacturing by using Quality Assurance as the vehicle:

Without discussing philosophy, a convenient tool would be to look at what the executive segment of manufacturing does. (See attached typical Management Activities Chart, Figure 5, page 60.) By discussing the why, when, where, whom, what and how of these activities as related to the entire scope of manufacturing, the political, sociological, technical, economic and psychological

dimensions of all manufacturing can be quickly discussed as a composite. This can be further refined to the area of Quality Assurance, as this subfunction exists in like structure and has its own whys, whats, whom, where, when and hows which answer to the executive level structure in the same manner.

These subject areas can be taught discretely by the various school system departments and synthesized at this session for the purposes of examining Quality Assurance as a composite. It might serve the purpose, at this time, to invite Quality Assurance personnel into the classroom to discuss their philosophy, ethics, and purposes as they are affected by and have affect on these subject matter areas.

The foods industry is particularly good for exploring in these areas. The pre-objectives accomplished in units 1 and 2 will be germaine here. Extension can be made into Food and Drug Administration, Laws and Regulations, Liquor production and sales, etc.

LABORATORY OR WORK ACTIVITY

The students can work singularly or in groups and examine the political, economic, sociological, psychological and technological aspects of Quality Assurance subfunctions in the Food and Kindred Products industry by:

1. Examining in-school cafeteria buying and selling practices.
2. Examining an in-town supermarket in these dimensions.
3. Arranging to visit a local farm or food producing plant for observation and interview.
4. Tracking food advertisements on television and noting their personal and family responses regarding the local supermarket.
5. What is quality to the purchaser? How does the consumer determine the quality of the purchase?
6. Who is in charge of quality control in the home?
7. How are products preferred and bought as related to quality?

INSTRUCTIONAL RESOURCES

Juran, J. M. (Editor). Quality Control Handbook, McGraw-Hill Publishing Company, 2nd Edition. 1961.

Kramer, A., Twigg, B. A.; Quality Control In The Food Industry: AVI Publishing Company, Westport, Connecticut. 3rd edition. Vols. 1 and 2. 1973.

Joslyn, M. A.; Heid, J. L.: Food Processing Operations, AVI Publishing Company, Westport, Connecticut. Vols. 1, 2 and 3. 1963.

Management Activities Chart, Figure 5, page 60.

EVALUATION

The students should be able to cite factors or parameters of sociology, political activity, the affect of technology and economics and psychological aspects of and contained within: (1) the Food and Kindred Products industry; and (2) those factors and parameters as they are encountered in the pursuit of a career in Quality Assurance activities in some of the occupations listed in the first objective of this section.

NOTE: The Management Activities Chart is useful for later activities concerned with selecting and preparing for a career. These elements are crucial for a systematic method of goal attainment. This paradigm can be used for evaluation in and during objective 5.

OBJECTIVE 3

The student will be able to utilize decision-making capabilities in the selection of this career or for other career fields that are compatible with his self-awareness and (future) self-identity.

ACTIVITY TO MEET OBJECTIVE 3:

Presentation: The teacher should overview the Quality Assurance subfunction, related occupations and work activities in Figure 6, page 63. Particular attention should be given to the work-activities in Inspection and Test. These activities are a Decision-Making Model. It would be ideal to be able to obtain a food specification and to follow the product through a production and test line to see the operations, results of measurement and what happens to the product, accept or reject.

Barring this, an ideal simulation would be to have the students select a product from their homes, that they may be buying or have bought. A general form of specification can be obtained from the Instruction Book of "tag" on the device or a warranty. Canned or frozen food is an excellent example. The process of the seven steps could then be followed and the Model formed and the steps interrogated.

Figure 5

TYPICAL MANAGEMENT ACTIVITIES CHART

ELEMENT	REAL CONCERN	ANSWERING TO	BY MEANS OF
PLANNING	What, Whom, When, Where, How	Why	Policies, rules, procedures, standards, regulations, goals, objectives.
ORGANIZING	What, Whom, Where, When, Why	How	Structure, Facilities, Location, Positions, authority, responsibility, communications.
SELECTING (Personnel/ Resources)	Where, How, When, Why	Whom	Counseling, Guidance, Tests, Screens, Evaluation Surveys, Interviews, Training & Education
		What	Technology, Engineering, Science, Economics
DIRECTING	What, Whom, When, Where, Why	How	Decision making, leadership, Problem solving, formatting, information retrival & analysis, time-management, product-mix, fiscal policies, schedules, forecasting manpower policies.
CONTROLLING	What, When, Where, Whom, How	Why	Actions and interactions of and between observation, audit, review, records, reports, standing rules, procedures, regulations, budgets, censure, discipline, reward.

Work Activity. Whatever is chosen as the product vehicle, the students would examine the specification; measure the product (listing the "tools" or data used) comparing the product to the specification; determining conformance (or not) recording the data (in proper form) and determining disposition. This is the prime function of all Quality Assurance and can be used to further examine the various knowledges and skills required to accomplish each step in the Model.

Also, this basic Model, in other terminology, is used by all listed subfunctions on the Model in those decision-making activities inherent to their role.

OBJECTIVE 4

The students will be able to use their self-awareness factors as tempered by above objectives assimilation, to proceed (or reject and re-select) with exploration and beginning skills acquisition activities related to their selected career.

ACTIVITY TO MEET OBJECTIVE 4:

Presentation: The instructor should give an overview of Quality Assurance subfunctions and activities within the Food and Kindred Products. At this time the students should have profiles of themselves and selected profiles of various occupations and careers within Quality Assurance. The object of this topic is to have the students, to the degree possible, take their own self-awareness and goals profile and utilize the information via the decision-making model, to decide to continue exploration in one or many Quality Assurance careers, or to reject further exploration in this field and select another (tentatively).

INSTRUCTIONAL RESOURCES

The Structure of Manufacturing, Figure 2, Page 16.

Food or other product specification.

Data concerned with end product use.

Previously listed texts and texts from Engineering Function Bibliography.

All prior data acquisition and work-activity sheets from within this topic section plus those of Units 1, 2, and 3.

Towards Matching Personal And Job Characteristics. In Occupational Outlook Quarterly. U.S. Department of Labor, Manpower Administration. Winter. 1971.

EVALUATION

The evaluation of this objective is in being able to utilize the element decision-making model in any dimension, be it Quality Control or personal or other.

This model is useful in the selection and predictive activities concerned with objective 5.

The evaluation criteria would be based on the ability of the student to acquire pertinent information and categorize it properly within the decision-making model and use the information to make a "good or proper" decision.

Evaluation of this unit would be made subjectively by both the instructor and student (with, perhaps, a counselor and/or industry resource personnel). The evaluation would be based on the amount of understanding that the student has of future needs (educational and experiential) as they relate to known student profile.

OBJECTIVE 5

The student will be able to identify, a proposed course of further education and/or experiences necessary to the continuing pursuit of a career within the career field selected at some desired or indicated level.

ACTIVITY TO MEET OBJECTIVE 5:

Presentation: After the decision-making and the first interpretation, either to continue exploration in Quality Assurance careers or to select another career field, the instructor should ask how the student plans to do this.

This should bring about identification of data-poor sections of the decision-making model and what other experiences and information might be desirable before making the final decision.

LABOR OR WORK ACTIVITY

The students should be able to utilize the decision-making model and the information properly weighted and categorically assigned. The students should be able to fill in the Management Activities Chart (Figure 4, page 52) converted to their own continuing plans for further education or preparation in some selected career in Quality Assurance or other career field.

Figure 6 - MODEL: OVERVIEW OF QUALITY ASSURANCE OCCUPATIONAL FIELD

QUALITY ASSURANCE AND QUALITY CONTROL AREA RESPONSIBILITY AND AUTHORITY	OCCUPATIONAL OR JOB FAMILY GENERAL WORK TITLE	FUNCTION AND SUBFUNCTION INTERFACE
1. Quality Assurance and Quality Control Management	General and Technical Managers or Directors; Administrative Assistants Secretarial and Clerical	Management Function Support Function Engineering Function
2. Quality Assurance Systems Engineering	Usually staff not line positions	Factory Function
3. Reliability Engineering 4. Maintainability Engineering 5. Systems Environment/Life Testing	Engineers (various); Mathematicians Highest Technician Levels	Management Functions Support Functions Factory Functions
6. Quality Control Engineering	General and Technical Managers Administrative Assistants Secretarial and Clerical Positions Line positions within QA/QC structure	Support Function Engineering Function Factory Function
7. Parts and Components Engineering 8. Materials and Processes Laboratory 9. Standards Laboratory 10. Test Equipment Engineering 11. Environmental Test Laboratory	Engineers (various); Highest Technician Levels Highest Inspector Levels Low to middle engineering and Factory Managers	Support Function Engineering Function Factory Function
12. Data Processing (acquisition, reduction and analysis)	Full spectrum of Data Processing subfunction	Support Function Engineering Function
13. Statistical Reports and Services 14. Field Engineering	Engineers (various); Highest Technician Levels	
15. Inspection and Test	Inspectors, various; all Technician grades	Engineering Function Factory Function

The student should be able to construct a career-ladder within the field of Quality Assurance and to determine future training, education requisites for each level. Also, the students should be able to relate what skills they already possess to those yet to be acquired, assuming they opt for careers in this occupational field.

ROLES AND SKILLS

PURPOSE

The purpose of this topic is to extend the methods of selection and inquiry learners have already initiated, by having them explore the skill and job characteristic components of occupations within a subfunction through a variety of methods. It is suggested that various audio-visual resources be used to review what goes on in the production process from the perspective of all functions. What steps and what tasks are involved? Who does them and what these people have to know and be capable of doing in order to perform these tasks? A secondary purpose is to give the learner the opportunity to study an industry in more depth to gain a better understanding of what manufacturing is all about.

DESIGN

The topic design provides the opportunity for learners to experience, through simulation, basic occupational tasks. Learner experiences are also designed to provide study of job performance, skill requirements and exemplary processing systems within an industry. The end result of these activities should be a better understanding of skill requirements for job occupations and the importance of specific job performance in the overall processing system.

SKILLS

The learners are provided the opportunity to practice communication and interpersonal skills as well as reading, writing and research skills. The first two are very important in terms of the work world and this topic is an opportunity to take a harder look at what comprises these skills. Another important skill acquisition will be self-assessment.

OBJECTIVE

The learner should be familiar with the skills required for entry level in various job categories and should be able to realize the idea of skill requirements in a processing system.

INTRODUCTION

Prior to the topic activities the instructor should spend some time discussing the lesson content and particularly the idea of simulation as a method of learning about something without actually having to be on-site. It is important that learners understand this idea before the lesson begins. Discussion should also focus on how skill requirements for jobs can be identified and what the term "entry-level skill" means. Again, it is important that learners understand this idea prior to experiencing the activities in the topic.

As part of the introduction, the group should also discuss what a processing system is. Particularly important is the concept of sequential steps. The idea that being able to perform one task in the sequence may be dependent upon someone else doing something is important. This will provide a basic understanding of the assembly line concept and the interrelationships of the other personnel such as lawyers, researchers, payroll personnel, etc., who are not in the line but are part of the total operation.

INSTRUCTIONAL RESOURCES

For typical manufacturing industry organization, stages of production, etc., see: Industrial Arts Curriculum Project: The World of Manufacturing. McKnight and McKnight.

Booklet: The Canning Industry. National Canners Association. 113 20th Street, N.W., Washington, D. C. 20036.

Useful Checklist:

1. PLANNING: Choose items to be served. Make a list of specifications (size, quality, etc.) for economy of purchase.

2. PURCHASING: Inspection.

3. STORAGE: Is refrigeration or other preservation necessary? (See Ball Corp.)

4. DESIGN.

5. PRODUCTION: Sandwiches, beverages, etc., preparing raw materials; making components; assembly, etc.

6. PACKAGING AND LABELING: Deceptive packaging and accuracy in labeling.

7. MARKETING AND DISTRIBUTION: Was market surveyed before production was initiated? How?

Filmstrip: Refrigerated Food Storage Principles. National Audiovisual Center. $1.50.

Book: Fundamentals Of Food Processing Operations. AVI Publishing Company. 1967.

Booklet: The Science Of Food Preservation (for students), and Some Aspects of Food Preservation (Teacher's Reference Manual), Ball Corporation.

Book: The Technology Of Food Preservation. AVI Publishing Company. 1970.

Film: Sweetness And Light. Association-Sterling Films (Sugar Refining Process)

Dictionary Of Occupational Titles. U.S. Department of Labor.

Job Guide For Young Workers. U.S. Department of Labor.

Film: Home, Sweet Homestyle. Association-Sterling Films. (Mass production baking)

EVALUATION PROCEDURE

The instructor should judge the overall success of this simulation activity relative to student participation and interest. The instructor should be especially sensitive to learner input into the activity like corrective suggestions, etc., which improve the production process.

It is important that learners realize the importance of rapidly effected technological advances in industry. The instructor should be satisfied that learners have gained this awareness.

TEACHING ACTIVITIES

As a springboard for class discussion a generalized manufacturing production/processing system should be presented, using handouts, transparencies, films or other aids. Discussion should then be directed toward the specialized area of food processing, with appropriate resources for support. The concept of simulation should be briefly reviewed, and used to lead into an explanation of how preparing a class luncheon can simulate the major activities in a food processing operation. Roles should be chosen by the learners in planning, purchasing, processing (preparing), packaging, marketing, or distribution. Learners should then choose roles consistent with the needs of the processing operation.

The class should then implement the activity, playing the necessary roles from planning to the ultimate role or consumers. For each of the roles identified, learners should develop a profile of the skills, knowledge and ability usually associated with each in the work world. Industry personnel can be used, standard resources and job descriptions (DOT, Occupational Outlook Handbook, etc.) can be referred to in developing these profiles.

Using information obtained from published sources, as well as first hand from field trip to and/or speakers from local industry, gather comprehensive data for analysis of plant operations. Each major department or system should be surveyed, using a prepared analysis sheet. Emphasis should be placed on new technologies or systems, and their impact on previously existing occupational groups, as well as their demands for new skills. Questions like the following can help focus learner efforts:

1. How have new production systems/machinery affected the employment of unskilled/semi-skilled workers?

2. How does the development of new technology affect employment? Is there need for more research and development people? When?

3. Have new occupational groups come into existence as a result of technological or systems advances?

4. Generally, have advances brought about any changes in the demand for skills, knowledge, ability, for workers entering the industry? (This question should be attended to in more depth than the others.)

Have learners choose a type of food processing operation which exists in the community, as a real world example can be examined. The learners should arrange on a chart, the proper sequence of the major operations the industry performs in producing products and classify the skill, knowledge and ability levels of the actions called for in these operations, using the Dictionary Of Occupational Titles and Job Guides For Young Workers and have them note any effects of increasing use of new technologies in food preservation techniques within the firm, such as freeze-drying, and automated processing equipment. Particular attention should be given to technical sequencing, mechanical operation, and the services and tasks of inspectors and monitors. The learners can gather much of this information from personnel within the firm. The instructor should insure that learners attend all the functions and major subfunctions as far as they are involved with or effect the production operations.

INSTRUCTIONAL RESOURCES

Analysis sheet...See, U.S. Department of Labor, Handbook For Analyzing Jobs and The Dictionary Of Occupational Titles.

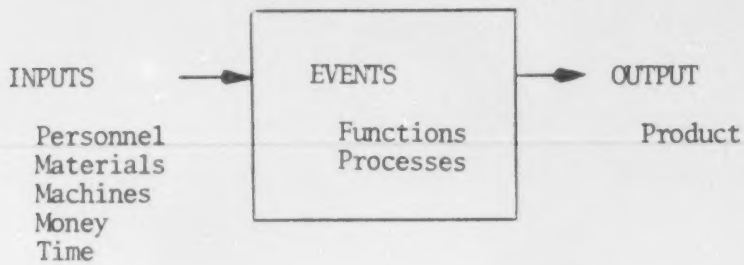
Task Analysis Inventories, A Method For Collection Job Information. United States Department of Labor, 1973.

Speakers from local food processing plants.

United States Department of Labor, Bureau of Labor Statistics: Industry Profiles, and Industry Trend Services, Food And Tobacco, 1968. Joint Council on Economic Education.

EVALUATION PROCEDURE

The sequencing and classifying should be reviewed for accuracy and completeness. A reasonably true accounting of what goes on in an actual operation should result from this activity. Accompanying this description should be a profile of the skill, ability, knowledge requirements for persons performing the various operations. Probably the best way of doing this is to ask learners to develop a flow chart which shows the process steps and provides space to enter the profiles next to the various operations. Below is a suggested schematic:



Learners can use this chart to highlight those operations where technology has changed or altered the character of the operations.

EMPLOYMENT PATTERNS

PURPOSE

There are two purposes for this topic. First, the topic provides a set of suggested activities which can give learners further experiences in exploring and learning about one segment of Manufacturing, namely, Food and Kindred Products. Second, the topic encourages learners to know more about the kinds of employment opportunities that exist now and in the future.

DESIGN

This topic is designed so that learners discover employment opportunities as a result of analyzing how, within the industry, various tasks are done and how emerging technology affects the need for people to work in these task areas. By designing the topic in this fashion the depth of exploration of the industry increases while directing the student's attention to assessing employment opportunities. Part of the topic design suggests that learners go to representative companies and talk with personnel about employment opportunities, both present and future oriented. The assistance of counselors will prove very helpful.

SKILLS

Learners are provided with opportunities to practice research, communication, interview and model construction skills as well as basic reading and writing skills. Modeling is a new skill for the unit and is considered very important since it provides a very useful tool for analyzing processes and jobs in a critical objective manner.

OBJECTIVE

The learner should gain further awareness of the industry in general, as well as specifically and to gain knowledge of the employment patterns and opportunities within the industry.

INTRODUCTION

The topic introduction should include general discussion of the kinds of tasks and industry has done on both a continuous and emerging basis. Continuing tasks are such things as insuring that packaging of products is consistent and within legal standards, that sanitary conditions are maintained, that the product is selling and so forth. Emerging tasks might be those concerned with ecology, and the need for new or better products.

The topic should also be introduced with discussion of how you discover what employment patterns and opportunities exist within an industry. The idea of researching should be discussed and the various methods of doing this research should be brought out, such as interviewing industry people, reading about new technological advances, researching government regulations which may place increased or new demands on industry. The instructor and learners should try to discuss several such methods, including the use of such standard resources as newspapers, employment opportunity bulletins, industry bulletins and the Occupational Outlook Handbook.

INSTRUCTIONAL RESOURCES

Representatives from industry can come to the classroom or meet with students at the job site to act as resource experts.

What's New On Labels. Slides, Cassettes and Teacher's Manual. National Audiovisual Center. $4.50.

The Fair Packaging And Labeling Act. (Slides) $9.66. D.E. Edgerly, Weights and Measures Coordinator, Office of Weights and Measures, U.S. Department of Commerce, Washington, D.C. 20234.

There are also several booklets available from the National Bureau of Standards.

Special Report: Education. Canner/Packer. One Gateway Center, Kansas City, Missouri 66101. (Survey and analysis of education for and within the food processing industry.)

A good general resource on employment opportunities is in the Occupational Outlook Handbook and is included here as a resource. It provides a good overview of the general labor market.

A Complete Course In Canning, from Canning Trade, Baltimore. 1969.

Standard career information sources, both government and commercial. (Careers, SRA, B'nai B'rith, Occupational Outlook Handbook.)

EVALUATION PROCEDURE

The instructor should monitor the task groups as they work. Decisions concerning the group performance should be based on the judgment of the instructor. The most important thing for the learners is to rate the employment opportunities for the occupational groups they encounter. To insure that they have accomplished this, the learners can be asked to complete a worksheet like that provided in the resources. Also, the instructor can

poll learners or ask them to write a short narrative rating present and future employment opportunities and the trends of these opportunities relative to which facets or problem area within the industry will have the greatest demand for new personnel.

The instructor should review the interview experience with the learners and judge their understanding and participation in the experience. Obviously, if some learners have conducted an interview while others have participated only by viewing or hearing a recording, the standard for instructor judgment should reflect the differences above.

The models developed should be reviewed as well as the rating the learners make about employment opportunities within the processes modeled. The ratings should be judged according to the structure and supportive information the learner provides.

TEACHING ACTIVITIES

Learners should be organized into task groups to explore ways in which the food industries address and attempt to control various production and ecological problems, such as deceptive packaging, nonuniform weights, air pollution, water pollution, etc. As the learners study these topics, they can be examining, through standard resources and newspapers, the kinds of employment opportunities that exist for the occupational groups they selected. The learners can also review projected increases in attempts to solve these problems and assess the impact of these future projections relative to employment opportunities. The instructor could ask learners to develop a chart or other suitable representation of their findings, both in terms of amount of industry time, money, etc., devoted to the problems and in terms of the employment opportunities. (The instructor may wish to work with the guidance department in determining the most effective management of this activity.) Learners should pay particular attention to opportunities for unskilled and semi-skilled workers in the industry to gain an understanding of why education and training are so important in today's and tomorrow's work world.

If an on-site visit can be arranged for at least a small group of students to meet with and interview a personnel representative from a food related industry, it would provide an excellent experience relative to exploring the kinds of employment opportunities that exist presently and those that may exist in the future. If possible, it would be helpful to have such a session taped (video or audio) so that the experience could be reviewed by the other learners. The instructor and/or counselor should work with learners in structuring and practicing the interview techniques to be used. A part of the structuring should insure that

occupational groups selected by all learners be covered. The instructor should be aware of the fact that an experience like this can also provide basic inquiry skills which can be of tremendous help to learners in the future.

An important aspect of food processing is the efforts to protect food from spoilage and to preserve or enhance color and taste. The learners can investigate how these tasks are done and what is involved in these tasks relative to the occupational groups the learners selected. It could prove interesting for the learners to model the ways in which the protection and preservation of food are accomplished by illustrating the steps and sequences in flow or task analysis form. Such a model can include illustrations of chemical treatment, refrigeration, canning, freezing, freeze drying, curing and the use of antibiotics and ultraviolet ray treatments. The amount of detail expected in this learner project will depend on time and what an instructor deems as appropriate in terms of the objective. The instructor should encourage the learners to check the employment opportunities in the task areas being modeled.

THE REAL WORLD

PURPOSE

The ultimate step in Exploration is the actual personal experience in the work world through participating in a cooperative program of some type, whether serving as a volunteer in the school or community or becoming involved in a work study or other similar program. If learners do gain such experience they should be able to make more realistic judgments about their own future life.

This topic is actually a set of suggestions reflecting ways in which this real world tryout can be provided for learners.

DESIGN

The design of this topic calls for the provision for work experience for learners. This will require the efforts of a placement coordinator or assigned school agent to work with learners and various industries, or other agencies in order to locate suitable situations for learners.

SKILLS

Learners seeking a personal work experience in the Food and Kindred Products area should receive experience in applying for jobs, interviewing for jobs, communication, interpersonal skills and basic work skills, like being on time, following directions and so forth, even if the experience is simulated within the school.

OBJECTIVE

Learners should have at least one personal work experience during the Exploration phase of their education life in order to gain an understanding and awareness of what work is all about. Also, they should be able to make decisions about their own future based in part on this work experience.

INTRODUCTION

Learners should be told that provisions have been made for them to participate in a work experience situation in the Food and Kindred Products industry or in a simulation program. Those learners who wish to take advantage of this should be told to apply for the "jobs" (which should be arranged and listed in advance). A standard application form should be available. (In order to insure a variety of types of opportunities, it is essential that certain experience and educational requirements not be considered although learners should fill in these sections on the application.) Arrangements should also be made so that learners can be interviewed for selected positions. They should be told that this will be part of the procedure for work experience placement. (This form should resemble those used by personnel departments at cooperating industrial sites. Possibly actual forms could be made available.)

INSTRUCTIONAL RESOURCES

Consult your local Chamber of Commerce, CIE Coordinator, or State Training and Employment Service for kinds of jobs available in your community.

National Frozen Food Association.

National Food Preservers Association; and National Audio-visual Center (films).

EVALUATION PROCEDURE

The learner can be assessed for participation. If the participation is a work-study, volunteer, or part-time employment experience, the supervisor or employer should be contacted to

assess how learners have performed. If the experience is in-school, the appropriate school personnel should be contacted relative to student interest, promptness and knowledge.

TEACHING ACTIVITIES

Learners interested in a personal work experience related to the Food and Kindred Products industry should be encouraged to apply for such an experience. Various kinds of out-of-school opportunities should be available. Learners should also be prepared to be interviewed for one of the available positions. As part of their work experience they should be watching, listening and learning about the work world. When they complete their work experience they should make a brief oral presentation to the class about their experiences.

If it is not possible or desirable to arrange out-of-school work experiences for the learners, a program of simulated experiences can be developed. Such a program could be conducted within school facilities taking advantage of the cafeteria and associated food service facilities. Learners could serve in various roles related to food storage, processing and preparation. Whenever possible, they could also take part in the purchasing, distribution, and bookkeeping functions, as well as other related activities. For all identified openings, learners should make a formal application, appear for an interview and be expected to maintain a work schedule, etc. Arrangements for and conduct of such a program should be made through the cooperation of home economics, science, cafeteria and guidance staff, to insure an integrated experience for learners.

If this situation prevails it would be an ideal time to establish an industry simulation by function: Management, Support, Engineering and Factory. Then the occupations could be assigned to interested students and a representative industry set up, operated and evaluated.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION

American Economic and Business History Information Sources. Robert W. Lovett, Editor. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1970.

Industrial Management Series. (R) (P). McGraw-Hill Textfilms, 330 West 42nd Street, New York, New York 10036. (Rent or Purchase) Titles are:

1. Delegating Work
2. Enforcing Rules and Procedures
3. Hidden Grievance
4. Personal Problems
5. Personality Conflict
6. Trouble With Women

THE SUPPORT FUNCTION

Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Mich. 48226. 1972.

Finance: Manpower & Economic Education: Opportunities in American Economic Life. Robert L. Darcy and Phillip E. Powell. Joint Council on Economic Education, 1212 Avenue of the Americas, New York, N.Y. 10036. 1968. (Revised 1972)

Personnel: Personnel Management. M.I. Jucius. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Ill. 60430. 1967.

Public Relations: Understanding Public Relations. (Metromedia Analearn) Didactic Systems, Inc., Box 4, Cranford, N.J. 07016. (A programmed text containing more than 1100 entries coverning advertising, public relations, marketing, business law, etc.)

Sales and Marketing: Career Information: Marketing & Distribution. American Vocational Association. 1510 H. Street, N.W., Washington, D.C. 1970.

To Market, To Market (FL). The Sperry and Hutchinson Co., Consumer Services, P.O. Box 935, Fort Worth, Texas 76101. (Deals with merchandising techniques.)

THE ENGINEERING FUNCTION

Engineering: Engineering As A Career. 3rd Edition. Ralph J. Smith. McGraw-Hill Book Co., 330 West 42 St., New York, N.Y. 10036. 1969.

Quality and Reliability Engineering: Day With the Upjohn Company. 16mm (FL) Optical Sound, Color, 29 minutes. Distributor: Upjohn Company, 7000 Portage Road, Kalamazoo, Missouri 49001. (Describes research and clinical testing, manufacture and packaging of products, filtering and extracting processes, testing and bottling procedure and assembly operations. 1965) (Free Loan)

THE FACTORY FUNCTION

Factory Occupations: Employment Outlook. Factory operatives, assemblers, inspectors, etc. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (Stock 2901-0825).

Kids and Cookies. 16mm Optical Sound, Color, 14 Minutes. Distributor: National Biscut Co., 425 Park Ave., New York, N.Y. 10022

OTHER REFERENCES

Meat Products: National Provisioner, National Provisioner, Inc., 15 W. Huron St., Chicago, Ill. 60610.

Poultry and Eggs Marketing. Poultry and Egg News, Inc., Box 1338, Gainesville, Ga. 30501.

Poultry Digest. Garden State Publishing Co., 4411 Landis Avenue, Sea Isle City, New Jersey 08243.

Dairy Products: Journal of Milk and Food Technology. International Association of Milk, Food, and Environmental Sanitarians, Inc., P.O. Box 437, Shelbyville, Ind. 46176.

Canned and Preserved Fruits, Vegetables and Sea Foods: Canning Trade. Canning Trade, Inc., 2619 Maryland Avenue, Baltimore, Md. 21218. Semi-Monthly. $5.00 per year.

Frozen Food Age. Frozen Food Age Publishing Corp., 366 Madison Avenue, New York, New York 10017. Monthly. $8.00 per year.

Grain Mill Products: Grain and Feed Journals - Farm Service Centers. Dean M. Clark, Board of Trade Bldg., Chicago, Ill. 60604. Semi-Monthly. $4.00 per year.

Bakery Products: American Independent Baker. American Bakers Publishing Co., 2420 Sedgwick Avenue, Bronx, N.Y. 10468. Monthly. $3.00 per year.

Bakery Industry. Clissold Publishing Co., 401 N. Wabash, Room 534, Chicago, Ill. 60611. Bi-weekly. $5.00 per year.

Sugar: Sugar Bulletin. American Sugar Cane League of the U.S.A., Whitney Bank Building, 228 St. Charles St., New Orleans, La. 70131. Semi-monthly. $5.00 per year.

Confectionery and Related Products: Candy and Baked Snack Industry. Magazines for Industry, Inc., 777 Third Ave., New York, New York 10017. Bi-weekly. $5.00 per year.

Beverages: American Soft Drink Journal. Publishing Enterprises, Inc., 3230 Peachtree Rd., N.E., Atlanta, Ga. 30305. Monthly. $5.00 per year.

Beverage Industry News. (Alcoholic Beverages) Industry Publications, Inc., 703 Market St., San Francisco, Ca. 94103. Semi-monthly. $.50.

Coffee and Cacao Journal. Coffee and Cacao Institute of the Philli-Pines, 867 Estrada, Manila, Phillipines. Monthly. $2.50 per year.

Macaroni Journal. National Macaroni Manufacturers Assoc., Box 336, Palatine, Ill. 60067. Monthly. $6.00 per year.

Soybean Digest. American Soybean Assoc., Hudson, Iowa 40643. 13 issues per year. $10.00 per year.

Your Future in Food Technology. Brissey, George. Richards Rosen Press. 1966. 159 p. $4.00. Library Edition $3.78. Discussion of requirements, training, and outlook for the application of food technology in the modern world.

Food Science & Technology: A Career For You? 10 p. Career Brief. Institute of Food Technologists, 221 North La Salle Street, Chicago, Ill. 60601.

Career Opportunities in the Meat Packing Industry. A representative listing of job titles, job descriptions, and academic requirements. American Meat Institute, 59 East Van Buren Street, Chicago, Ill. 60605.

Manual of Job Descriptions (Baking). American Bakers Cooperative, Inc., Teaneck Road, Teaneck, New Jersey.

Baking Industry Job Descriptions. Detailed descriptions of approximately twenty jobs, one sheet per job. AIB.

A Complete Course in Canning. Canning Trade, Baltimore, Md., ninth edition, 1969. Contains a brief history of canning; suggestions for the contracting of acreage and buying harvested crops; directions for factory handling, processing, and packaging; recipes for speciality products; suggested layout for plants; discussion of food inspection, and other topics related to canning.

Health and Nutrition: Food and Nutrition - Food Needs of Family Members. Supplemental Lessons for Training Extension Aids. USDA Extension Service. For sale by Supt. of Documents. (35¢) 52 pp.

CAREER INFORMATION SOURCES

Canning and Preserving Industry. Chronical Guidance Publications, Inc., Moravia, N.Y. Describes employment opportunities in the canning and preserving industries.

Finding Out About Bottling Plant Workers. Science Research Associates, 1967. 4 p. 45¢. Junior occupational brief summarizing what the work requires and offers.

Finding Out About Frozen Food Processors. Science Research Associates, 1967. 4 p. 45¢. Junior occupational brief summarizing what the work requires and offers.

Finding Out About Food Technologies. Science Research Associates, 1967. 4 p. 45¢. Junior occupational brief containing brief facts about the job.

Food Freezing and Canning Workers. Occupational Brief No. 123. Science Research Associates, Inc., Chicago, Illinois. Describes employment opportunities in the freezing and canning industries.

PROGRAM PRODUCT CATEGORIES

INTRODUCTION

Reference is made to Figure 2, page 16 and Table I, page 17. The product categories are shown along the bottom line of the manufacturing structure and are numbered 19 through 39. These numbers are related to specific product categories listed in Table I. When any product category and one or many products is taken as a curriculum design baseline, the structure of manufacturing will become dynamic in its interrelated elements. Starting curriculum design at any point of product interest will generate the design parameters by such typical questions as:

1. What functions are necessary to the manufacture of this product?

2. What processes are necessary?

3. What characteristics will this type of Manufacturing Enterprise encompass?

Also, by use of the interrelationship between functions, processes and products, exploration can be widely and rapidly accomplished. The entire span of subfunctions, work force structure, process machinery and equipment and manufacturing environments is made highly visible. During this phase of study it will be possible to keep away from teaching narrow jobs and tasks and permit open-ended exploration by function.

The following pages contain:

1. Brief description of each product category.

2. Suggested learning experiences per category.

3. Sources of information and resources for each product category. These are classified and related by function and by general applicability.

The Exploration Student Manual contains the same structure of product categories and is expanded in terms of:

1. Industry definition
2. Types of products
3. Importance
4. Typical jobs
5. Expected working conditions
6. The future of the industry

Both this Instructor's Guide and the Student Resource Manual should be utilized in design, development and operation of a program in exploration of manufacturing occupations.

The manufacturing products category include the twenty-one products categories that follow in the next section.

ORDNANCE AND ACCESSORIES

This major group includes establishments engaged in manufacturing artillery, small arms, and related equipment; ammunition; tanks and specialized tank parts; sighting and fire control equipment; and miscellaneous ordnance and accessories, not elsewhere classified.

ACTIVITIES AND EXPERIENCES

In order to understand how ordnance and accessories contribute to society, instructional activities should include:

1. Visit the library and research the inventions, processes, and products that were the result of ordnance industry output, both in war and peace.

2. Research the changing defense methods that have resulted from changes in weapon systems and their capabilities.

3. Read and consider the effect war has on this country's economy, especially during the second world war. Each student should also realize the effect defense cutbacks have on employment, income, and general investment and consumption.

To more positively identify with the field of ordnance production, it is suggested that the instructor:

1. Read personnel accounts of the role of radar and the spitfire airplane in the defense of England.

2. Survey and classify the number of types of sporting equipment produced and distributed within the United States for recreational uses.

In order to simulate the effect of variations in ordnance capabilities on international relations, the instructor may:

1. Play standard international simulation games that are available commercially but vary the industrial and war capabilities of the nation states.

2. Create crisis situations calling for rapid increased ordnance capabilities and form task groups to plan, produce, and service these situations as necessary.

3. Role play the effect of international arms sales on the diplomacy and domestic governments of developing nations by using nations as primary actors.

To simulate the skills required in entry level jobs within the ordnance industry, the instructor may:

1. Work with the industrial arts teacher to gain experience in welding, molding, and sheet metal processing.

2. Use model kits of ordnance weapons or systems to assemble, install, and inspect such weapons or systems.

In order to be informed of the employment outlook within the ordnance field, the instructor should:

1. Interview personnel directors and professional groups of scientists, engineers, and technicians.

2. Conduct a survey of ordnance and accessory firms located within the community to find the number and type of openings expected in the near future.

3. Talk with entry level workers concerning the skill required for this industry as they have experienced it.

To gain experience with the operations within the ordnance industry, the instructor may:

1. Make use of old equipment to dismantle, inspect, and assemble small arms, sighting and fire control equipment.

2. Arrange for part time, summer, or other work programs within the ordnance industry in the local community.

3. Visit military establishments to carry out entry level inspection and operation of ordnance weapons and equipment needed to service them.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Business Principles and Management. B. A. Shilt, D. L. Carmichael, W. H. Wilson, 5th Edition. South-Western Publishing Company, 5101 Madison Road, Cincinnati, Ohio 45227. 1967.

Foreman's Handbook. 4th Edition. Carl Heyel, Editor. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1967.

THE SUPPORT FUNCTION:

Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1972.

Personnel Management and Supervision. R. P. Calhoon. Appleton-Century Crafts, 440 Park Avenue South, New York, New York 10016.

Economics for the Concerned Citizen. (R) Each film 16mm. Optical Sound, B&W, 29 minutes. Rent from Indiana University Audio-Visual Center, Bloomington, Indiana 47401. Titles are:

1. The American Economy and the People in it.
2. Markets and Prices: How do We Decide What, How and for Whom.
3. The Realities of a Mixed Economy.
4. How we Raise Our Living Standards: The Goal of Economic Growth.
5. Fiscal Policy: Taxing Government Spending, and the National Debt.
6. The United States in the World Economy: Trade and Investment.
7. International Monetary Problems: Gold and the Balance of Payments.
8. Other Economic Systems.
9. Some Problems of a Growing Economy.
10. Economic Stability: The Goal of Full Employment Without Inflation.
11. Money, Banking, and Monetary Policy.
12. What Economics is All About.

THE ENGINEERING FUNCTION:

Mechanical Engineering: The Sources of Information. The Shoe String Press, Inc., 995 Sherman Avenue, Hamden, Connecticut 06514.

A Career of Opportunity (Engineering). National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006. 1967.

THE FACTORY FUNCTION:

General Industry. J. R. Lindbeck, I. T. Lathrop, J. L. Feirer. C. A. Bennett Company, Peioria, Illinois. 1969. (Gives overview of industry, materials, processing, and includes information on occupational opportunities.)

World of Manufacturing. Industrial Arts Curriculum Staff, Editors. Published by McKnight and McKnight. Order From: Taplinger Publishing Company, 200 Park Avenue, New York, New York 10003. 1971.

Factory Inspectors. Science Research Associates, 259 East Erie Street, Chicago, Illinois 60611. 1968. (Describes nature of work, training, working conditions, opportunities, and outlook.)

Factory Occupations: Employment Outlook. Factory operatives, assemblers, inspectors, etc. Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402. Stock No. 2901-0825.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Rev. 1972. Ask for: Ordnance, Weapons, Arms, or Ammunition.

CAREER INFORMATION SOURCES:

Careers in Depth. Richards Rosen Press, Inc., 29 East 21st Street, New York, New York 10010. 1969-73.

Careers After High School. Peter Sandman and Tim Haight. The MacMillan Company. 185 pp. (Paperbound)

TOBACCO MANUFACTURERS

This major group includes establishments engaged in manufacturing cigarettes, cigars, smoking and chewing tobacco and snuff and in stemming and redrying tobacco.

ACTIVITIES AND EXPERIENCES

In order to become aware of the impact the tobacco industry has on society, the instructor should:

1. Visit the library to locate historical accounts of the development and utilization of tobacco and trace the vital role it played in the settlement and socio-economic development of the Southern United States.

2. Review the amount and distribution of taxes paid by the grower, manufacturer, distributor and consumer of tobacco products in the United States yearly.

3. Survey students and other members in the local area to determine tobacco utilization on a percentage basis.

4. Research health and safety factors to determine tobacco's affect on the health of people.

To better understand government's role in the tobacco industry:

1. List the regulating, licensing, and inspecting actions of federal, state and local governments on the tobacco industry.

2. Review the changes brought about by governmental pressure on the tobacco industry during the last decade.

To gain a better realization of the changing employment opportunities in the tobacco industry, the instructor should:

1. Read trade journals of the tobacco industry technical or trade associations and note the types of jobs that are advertised. Also research back issues and compare the opportunities advertised.

2. Visit a tobacco factory or large retail store and talk to employees. Ask them to trace their job history and relate to the changes in their employment in the tobacco industry.

3. Interview personnel managers in areas where the tobacco industry is located. Ask them to discuss the observed changes in the tobacco hiring requirements.

4. Review the type of technical and scientific career ladders growing within the tobacco industry as a result of increased automation and diversification.

In order to identify positively with the tobacco industry, it is suggested the instructor:

1. Research the negative impact of over consumption of certain forms of tobacco by selected individuals. This could emphasize the benefits related to no tobacco usage or tightly controlled consumption.

2. Investigate the funds that are made possible by revenue received from tobacco taxes.

3. Consider the advantages that result from benefits to tobacco industry research.

4. Objectively weigh the benefits received by the tobacco industry employees by wages versus the losses imposed by health and/or unemployment caused by advertising controls.

To gain knowledge of employment opportunities within the sub-fields of the tobacco industry, the instructor may:

1. Interview personnel directors, professional groups, and union representatives from such categories of tobacco as chewing tobacco, snuff, pipe tobacco, cigarette, cigar and cigarillo tobaccos.

2. Interview representatives of the finance, marketing, research, quality control, distribution and similar adjacent occupations associated with the tobacco industry.

3. Talk with workers at the various sites with respect to career ladders, working environments and compensations.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Business Principles, Organization, and Management. H. A. Tonne, S. I. Simon, E. C. McGill, 2nd Edition. Gregg Division, McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1963.

Management - Part II of Automation. 16mm. Optical Sound, B&W, 24 minutes. Distributor: McGraw-Hill Text-Films, 330 West 42nd Street, New York, New York 10036.

Simulations and Games

Effective Supervision. Didactic Systems, Inc., Box 4, Cranford, New Jersey 07016. Playing time: approximately 3 hours. 3-5 players per team.

THE SUPPORT FUNCTION:

Data Processing: Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1972.

Legal: Today's Business Law. K. E. Goodman. Pitman Publishing Corporation, 6 East 43rd Street, New York, New York 10017. 1966.

Personnel: How to Conduct the Selection Interview. (Programmed Instruction) Metromedia Analearn. Distributor: Didactic Systems, Inc., Box 4, Cranford, New Jersey 07016.

Sales and Marketing: Marketing and Distribution. R. C. Mason and P. M. Roth. Gregg Division, McGraw-Hill Company, 330 West 42nd Street, New York, New York 10036. 1968.

Sales and Marketing: Career Information: Marketing and Distribution. American Vocational Association, 1510 H Street, N.W., Washington, D.C. 1970.

THE ENGINEERING FUNCTION:

Engineering As A Career. 3rd Edition. Ralph Smith. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1969.

THE FACTORY FUNCTION:

Factory Inspectors. Science Research Associates, 259 East Erie Street, Chicago, Illinois 60611. 1968. (Describes nature of work, training, working conditions, opportunities, and outlook.)

Retail Tobacconist. Retail Tobacconist Printing and Publishing Company, 1860 Broadway, New York, New York 10023. Monthly.

Tobacco Record: The National Magazine of the Tobacco Industry. Tobacco Industry Publishing Company, Inc., P.O. Box 157, Los Altos, California 94022. Monthly.

TEXTILE MILL PRODUCTS

This major group includes establishments engaged in performing any of the following operations: (1) preparation of fiber and subsequent manufacturing of yarn, thread, braids, twine and cordage; (2) manufacturing broad woven fabric, narrow woven

fabric, knit fabric, and carpets and rugs from yarn; (3) dyeing and finishing fiber, yarn, fabric and knit apparel; (4) coating, waterproofing, or otherwise treating fabric; (5) the integrated manufacturing of knit apparel and other finished articles from yarn; and (6) the manufacture of felt goods, lace goods, boned-fiber fabrics and miscellaneous textiles.

This classification makes no distinction between the two types of organizations which operate in the textile industry: (1) the "integrated" mill which purchases materials, produces textiles and related articles within the establishment, and sells the finished products; and (2) the "contract" or "commission" mill which processes materials owned by others. Converters or other non-manufacturing establishments which assign materials to contract mills for processing (other than knitting) are classified in non-manufacturing industries; establishments which assign yarns to outside contractors or commission knitters for the production of knit products.

ACTIVITIES AND EXPERIENCES

Knowledge of the contribution textile production makes to society can be increased by:

1. Reading historical and/or fictional accounts of this country's expansion that were influenced by markets, machines, and money associated with fiber products.

2. Reading the role of the textile industry in the development of synthetic fibers and listing several uses of these materials in the home and business.

3. Visiting a textile mill if one is in the area. If not, visit a yarn, fiber, or other fabric retail store to get an idea of the types that are manufactured.

To develop more awareness of the employment outlook for the textile industry:

1. Visit the library and review the periodical listing for trade journals and informational booklets in this field.

2. Write to private and public agencies in the textile industry for information, mill location and sales documents.

3. Check area mills and/or retail stores and ask the managers to give their outlooks on future employment.

4. Consult reference books such as Career Opportunities and the Occupational Outlook Handbook.

5. Attend professional or trade meetings related to the textile or clothing industry. You may also want to join these local organizations as a student member.

6. Meet with area retailers in the textile trades and perhaps obtain part-time employment for a closer look at the business.

7. Discuss the textile business with current workers to better understand their way of life and reciprocal identification.

To familiarize students with the entry level requirements in the fields of textile production, the instructor and students may:

1. Construct dimensional models of establishments engaged in the preparation of natural fibers or synthetic fibers. (The model should reflect the states involved in the production of standard stock textile materials.)

2. Identify the basic operations performed by typical textile workers in terms of observed skill requirements (such as manual, mental recall, discrimination, or problem-solving).

3. Visit personnel offices and inquire about the job vacancies related to the textile industry.

4. Read local newspapers and national journals and check the job ads.

5. Review the references in the sources of information for career opportunity publications in this field.

To gain "hands-on" experience with the operations in the textile field, the instructor may:

1. Visit a site where wool, cotton, silk or other fibers are processed. Talk with employees and discuss their experiences.

2. Obtain part-time work in a mill or retail store that manufactures or sells textile products.

3. Visit film libraries and view films and/or slides that depict work in the textile industry.

To better understand career ladders in the textile production industry, the instruction should:

1. Interview personnel directors, professional and union representatives, and various workers to visualize the progression of typical employees.

2. Visit trade shows or similar expositions of clothing products and review the marketing information relative to employee opportunities.

3. Read the references on Career Ladders and/or Career Opportunities in the Career Information Sources, page 276, or visit a local Career Center to obtain the latest career information.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Foreman's Handbook. 4th Edition. Carl Heyel, Editor. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1967.

THE SUPPORT FUNCTION:

Finance: Manpower and Economic Education: Opportunities in American Economic Life. (Text) Robert L. Darcy and Phillips E. Powell. Joint Council on Economic Education, 1212 Avenue of the Americas, New York, New York 10036. 1968.

Public Relations: Effective Public Relations. 4th Edition. Scott M. Cutlip and Allen H. Center. Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632. 1971.

THE ENGINEERING FUNCTION:

Engineering as a Career. 3rd Edition. Ralph J. Smith. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1969.

Quality and Reliability Engineering: Total Quality Control. A. V. Feigenbaum. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1961.

THE FACTORY FUNCTION:

Basic Instrumentation: Industrial Measurement. Patrick O'Higgins. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1966.

Your Career in Wholesale Distribution. National Association of Wholesaler-Distributors, 1725 K Street, N.W., Washington, D.C. 20006. (Free)

American Fabrics. Dove Publishing Company, Inc., 24 East 38th Street, New York, New York 10016. (Quarterly)

Fibre and Fabric. Fibre and Fabric Publishing Company, P.O. Box 401, Acton, Massachusetts 01720. (Monthly)

APPAREL AND OTHER FINISHED FABRIC PRODUCTS

THE MAJOR GROUP AS A WHOLE

This major group, known as the cutting-up and needle trades, includes establishments producting clothing and fabricating products by cutting and sewing purchased woven or knit textile fabrics and related materials such as leather, rubberized fabrics, plastics and furs.

Included in the apparel industries are three types of establishments: (1) the "regular" or inside factories; (2) contract factories; and (3) apparel jobbers. The regular factories perform all of the usual manufacturing functions within their own plant; the contract factories manufacture apparel from materials owned by others; and apparel jobbers perform the entrepreneurial functions of a manufacturing company, such as buying raw materials, designing and preparing samples, arranging for the manufacture of the garments from their materials and selling of the finished apparel.

Custom tailors and dressmakers not operating on a factory basis are classified in non-manufacturing industries; establishments which purchase and resell finished garments but do not perform the functions of the apparel jobbers are classified in Wholesale Trade.

ACTIVITIES AND EXPERIENCES

To identify with the apparel industry:

1. Visit a museum to view both the development of textiles, leather, fur, rubber and plastic industries, and the application of these materials to the apparel of the period.

2. Browse through clothing stores and note the various types of materials, styles and fabrics that are used.

3. Arrange for a tour through a clothes factory and watch the various operations used in making the products.

4. Talk to tailors and ask them to describe their trade and the different methods and materials they must use.

To increase an appreciation of the contributions of the apparel to society, the instructor may:

1. Survey the non-clothing, fabricated textiles used in the home, such as curtains, bedspreads, blankets, tablecloths, awnings, etc.

2. Research the special uses of protective apparel in connection with chemical, medical, and technical research as well as such occupations as fire fighting, auto racing and space flight.

3. Review the various uses apparel made during past wars such as camouflage, clothes, tents, truck covers, etc.

In order to realize the skills required in a small apparel factory catering to the demands of rapid style change, it is suggested the instructor:

1. Work with miniature garments to simulate the design, cutting, sewing, pressing and similar handwork associated with the production of a finished garment.

2. Visit an apparel factory and follow a worker for a period of time and observe the things he/she does and the skills he/she uses.

3. Write down what is believed necessary to enter the apparel industry as a worker and then compare it with what is actually described by personnel departments and trade magazines.

To gain experience with the skills associated with the apparel industry, it is suggested the instructor and students:

1. Work with the home economics instructor to perform the various jobs of apparel production such as pattern making and drafting.

2. Perform cutting room operations such as marking, cutting, and assembling.

3. Perform sewing room operations such as hand and machine sewing, trimming, and inspecting.

4. Obtain part-time work with an apparel factory and/or a tailor shop or dressmaker.

5. Obtain a part-time job as an administrative assistant or a maintenance helper in a large company to increase your awareness of career ladders within the industry.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Business Principles and Management. B. A. Shilt, D. L. Carmichael, W. H. Wilson, 5th Edition. Southwestern Publishing Company, 5101 Madison Road, Cincinatti, Ohio 45227. 1967.

THE SUPPORT FUNCTION:

Finance: Manpower and Economic Education: Opportunities in American Economic Life. Robert L. Carcy and Phillip E. Powell. Joint Council on Economic Education, 1212 Avenue of the Americas, New York, New York 10036. 1968. (Revised 1972)

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Sales and Marketing: Marketing and Distribution. R. E. Mason and P. M. Roth. Gregg Division, McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1968.

THE ENGINEERING FUNCTION:

Technicians in the Engineering Field, Vol. I Career Opportunities for Technicians and Other Specialists. W. M. Arnold, Editor. J. G. Ferguson, Chicago, Illinois. 1968.

Quality and Reliability Engineering: Total Quality Control. A. V. Feigenbaum. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1961.

THE FACTORY FUNCTION:

General Industry. J. R. Lindbeck, I. T. Lathrop, J. L. Feirer. C. A. Bennett Company, Peoria, Illinois. 1969.

Apparel Manufacturer. Forge Association Publications, Inc., Riverside, Connecticut 06878. Monthly.

Gentlemen's Quarterly. Esquire, Inc., 488 Madison Avenue, New York, New York 10022. (Eight Times Per Year)

Men's Wear Magazine. Fairchild Publications, Inc., 7 East 12th Street, New York, New York 10003. (Semi-Monthly)

Women's Wear Daily. Fairchild Publications. Daily except Saturday and Sunday.

Earnshaw's: The Magazine of Infants', Boys', and Girls' Wear. Earnshaw Publishing Company, 393 Seventh Avenue, New York, New York 10003. (Monthly)

Fur Age Weekly. Fur Vogue Publishing Company, 127 West 30th Street, New York, New York 10001. (Weekly)

Fur Parade. Fur Parade, Ltd., 330 Seventh Avenue, New York, New York 10001. (Quarterly)

Blue Jeans. 16mm. Optical Sound, B&W, 6 minutes. 1958. Distributor: Denim Council, 1457 Broadway, Suite 510, New York, New York 10036.

Leather in the Making. 16mm. Optical Sound, Color, 30 minutes. Brown Shoe Company, Public Relations, 8300 Maryland Avenue, Clayton, Missouri 63105. 1960.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Textiles Instruction: Clothing Instruction, Finishing; Clothing: Needle Trades, Costume Design, Pattern Making.

LUMBER AND WOOD PRODUCTS

This major group includes logging camps engaged in cutting timber and pulpwood; merchant sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, and plywood mills and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes.

ACTIVITIES AND EXPERIENCES

To appreciate the contributions lumber makes to society:

1. Visit the library and list the uses of lumber and wood products in the home and industry. Paper and naval stores should also be investigated.

2. Trace the impact of such operations as clear cutting and plywood production on soil, air and water resources. Attempts to improve management of these resources should be included.

3. Visit a lumber mill and/or a lumber yard and note the amount of lumber that is sold. Ask the mill/yard manager to discuss the yearly sales of the business.

In order to be acquainted with the actual physical, economic and social conditions associated with lumber production, the instructor should encourage students to:

1. Compile a profile of job interests, attitudes and aptitude description from such sources as the OHIO INTEREST SURVEY and compare the results with conditions of employment in lumbering as described in trade literature, news releases, and reference works such as the DICTIONARY OF OCCUPATIONAL TITLES.

2. Talk to personnel directors, union representatives and workers to get their views on the conditions in the lumber industry.

3. Get the opinions of classmates, family and friends concerning the challenges, rewards and demands of outdoor work in forests and lumber yards.

For an awareness of the job operations in lumbering:

1. Review a model of a logging camp, a sawmill and a lumber yard.

2. Construct working models of such operations as cutting, sawing and surfacing. (Get the assistance of the industrial arts or carpentry teacher.)

3. Read case studies about operations in the lumber industry and role play the various workers parts.

4. Visit a site where lumber operations are being performed. Observe the various tasks performed and ask different workers for their opinions relative to their respective jobs.

To orient yourself with the career ladder in timber cutting industries:

1. Use small branches for practicing the jobs of the "bucker," the "high climber" and the "faller."

2. Visit a forest and role play the part of a supervisor or a "cruiser" to get an idea of the immensity of the job.

To get experience in the primary operations associated with lumber and wood industries:

1. Get permission to enter a woodlot and identify a tree to be cut (cruiser), top the tree and remove interfering branches (high climber), and cut down the tree (faller), remove bark and branches, and cut tree to specified lengths (bucker).

2. Have the timber moved (logger) to the school wood shop where additional operating such as sawing, planing, sorting and stacking could be carried out.

3. Process the wood into such basic forms as crates, plywood or toothpicks.

4. Obtain part-time work in a lumber mill, wood shop, or lumber yard to get the feel of working with lumber.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Service, 135 West 50th Street, New York, New York 10020. 1967. (Free)

THE SUPPORT FUNCTION:

Accounting for Your Future. United Business Schools Association, 1730 M Street, N.W., Suite #401, Washington, D.C. 20036. (Free)

THE ENGINEERING FUNCTION:

How A Mongol Pencil Is Made. (Engineering Wall Chart) Eberhard Faber Pen and Pencil Company, Attention: Advertising Department, Wilkes-Barre, Pennsylvania 18703.

Quality and Reliability Engineering: The Torture Testers. (FL) 16mm. Sound, Color, 13-1/2 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

Manufacturing and Quality Control of Structural Glued Laminated Timber. (FL) 69 Slides. Silent, with Script. Color. American Institute of Timber Construction, 333 West Hampden Avenue, Englewood, Colorado 80010.

THE FACTORY FUNCTION:

General Industry. J. R. Lindbeck, I. T. Lothrop, J. L. Feirer. C. A. Bennett Company, Peoria, Illinois. 1969.

Impact Testing of Materials. W. Spaeth, M. E. Rosner, Ed. Gordon and Breach, New York, New York. 1961.

Manufacturing Policy. 6 Vols., 3rd Edition. E. Wickham Skinner and David C. Rogers. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430. Vol. 2 - The Furniture Industry. Paperbound.

Bibliography of Papermaking. Publication Sales Department. Technical Association of the Pulp and Paper Industry, 360 Lexington Avenue, New York, New York 10017. 1970.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institution of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Lumber Industry: Forestry Occupations.

Forest Products Journal. Forest Products Research Society, 2801 Marshall Court, Madison, Wisconsin 53705. (Monthly)

Wood and Wood Products. Vance Publishing Corporation, 300 West Adams Street, Chicago, Illinois 60606. (Monthly)

Woodworking and Furniture Digest. Hitchcock Publishing Company, Wheaton, Illinois 60187. (Monthly)

World Wood. Miller Freemand Publications, Inc., 500 Howard Street, San Francisco, California 94105. (Monthly)

Mill Work, Veneer, Plywood, and Prefabricated Structural Wood.

Plywood and Panel. Saturday Evening Post Company. Box 567B, Indianapolis, Indiana 46206. (Monthly)

FURNITURE AND FIXTURES

This major group includes establishments engaged in manufacturing household, office, public building, and restaurant furniture; and office and store fixtures. Establishments primarily engaged in the production of mill work are classified in Industry 24; stone and concrete products in Major Group 32; laboratory and hospital furniture in Major Group 38; beauty and barber shop furniture in Major Group 39; and woodworking to individual order or in the nature of reconditioning and repair in non-manufacturing industries.

ACTIVITIES AND EXPERIENCES

To identify positively with the industry of furniture production:

1. Trace the history of furniture making and the influence it has on the values and level of technology of a culture.

2. Observe the representative styles of furniture and learn to identify the styles by sight.

3. Visit a furniture factory and observe the skill it requires to produce a piece of quality furniture.

4. Talk to a master woodworking craftsman and note the appreciation he has for good furniture.

In order to learn the different job descriptions in the furniture industry, encourage students to:

1. Consult references such as the Occupational Handbook or the Encyclopedia of Careers.

2. Categorize the jobs described into the nature of the skills required.

3. Visit a furniture factory personnel office and get a list of different job classifications in that business.

4. Ask for an application form at a furniture business establishment and note the jobs listed and the skills required.

To simulate job operations associated with the furniture industry, the following is suggested:

1. Practice furniture assembly on old discarded items.

2. Watch the operations of furniture making and learn to identify systems of machine operations and to isolate operating principles from written descriptions.

3. List the operations and skills used in furniture manufacturing and learn the differences in wood products.

4. Participate in a woodworking class to get actual experience in making wood furniture.

In order to understand the changing employment opportunities in the furniture industry:

1. Construct a display of the process of production of plactic molded furniture. List the operating skills needed and replaced.

2. Prepare a world map showing the import of furniture, its source and magnitude.

3. Interview workers, management, and consumers as to their opinions of furniture export and import.

4. Visit a furniture factory and ask the personnel manager to explain the causes of employment opportunity changes.

To gain experience and knowledge in the furniture industry, the following activities may be followed:

1. Learn the handicraft of the industry by enrolling in wood shops and learning to saw, shape, bore, sand and operate lathes.

2. Enroll in furniture upholstery classes and perform such operations as trimming, filling, sewing, cutting and springing.

3. Obtain part-time employment in a furniture factory or an upholstery factory.

Awareness of the career ladders associated with the furniture industry can be obtained by:

1. Visiting wood and wood product plants, textile mills, and metal processing plants to observe the raw materials used in furniture production. Learn to operate some of the basic machines under close supervision.

2. Talk with workers and perform entry level operations in such departments as machine operation, assembly, finishing, and cabinetmaking. Note the degree of job training required, and the compensation received.

3. Interview plant foremen, inspectors, and expeditors. List skills needed for success and the opportunities for specialized training to fill these responsible positions.

4. Read the references on careers in the furniture industry such as: Careers In Depth and The Encyclopedia Of Careers and Vocational Guidance.

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THE FACTORY FUNCTION:

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The Encyclopedia of Careers and Vocational Guidance. William E. Hopke. Doubleday and Company, Inc., 501 Franklin Avenue, Garden City, New York 11530. 1966.

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Furniture Design and Manufacturing. Graphic Arts Publishing Company, 7373 Lincoln Avenue, Chicago, Illinois 60646. (Monthly)

Furniture Field. Mimi R. Phillips, 609 Westwood Boulevard, Los Angeles, California 90024. (Bi-Monthly)

Home Furnishings Daily. Fairchild Publications, 7 East 12th Street, New York, New York 10003. (Four/Week)

PAPER AND ALLIED PRODUCTS

This major group includes the manufacture of pulp from wood and other cellulose fibers, and rags; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products such as paper coated off the paper machine, paper bags, paper boxes and envelopes.

ACTIVITIES AND EXPERIENCES

In order to better understand the contributions the paper manufacturing industry makes to society:

1. Keep accurate records of the number of items entering the home during a two-week period that are composed of paper or paper products.

2. Divide the list above into two categories: (1) those products using paper as expendable items, and (2) those in which paper is an intrical part of the manufactured product itself.

3. Observe the different uses of paper in the typical classroom and relate them to a manufacturing process.

To increase knowledge of job descriptions within the paper manufacturing industry, the student may:

1. Research such occupations as "slashers," "screeners," and "beater engineer" in the Dictionary Of Occupational Titles or the Occupational Outlook Handbook.

2. Categorize the job descriptions obtained into jobs calling for a manual dexterity, recall, discrimination and problem-solving skills.

3. Visit a paper mill to observe the different jobs and discuss the tasks performed with the individual workers.

Simulate the operations associated with the paper manufacturing industry with activities such as:

1. Make pulp from bits of tissue paper by mixing them with hot water, then with liquid starch.

2. Screen the material using a sieve screen.

3. Use pressure and/or heat to dry the screen pulp.

4. Dip the paper into a sizing mixture and repeat the drying activities.

To gain insight into the process of producing paper and paper products from wood or reused fibers, design a layout of a continuous feed process from logs in a hot pond to the calendaring of finished paper.

For experience with entry level jobs within the paper manufacturing industry, it may be possible for students to:

1. Visit a processing plant and observe the several operations necessary to prepare the logs for the grinder process.

2. Perform the screening, washing, beating, and drying processes under the supervision of a teacher.

3. Perform the refining, cleaning, drying and calendaring processes with close supervision.

4. Obtain part-time employment in a paper mill or processing plant.

To identify with the field of paper manufacturing:

1. Prepare a notebook of the various operations in a paper mill.

2. Interview workers, union representatives, and personnel managers to get their views of the opportunities, rewards, and working conditions in the paper manufacturing industry.

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THE MANAGEMENT FUNCTION:

Forms of Business Organization. Graflex Education and Training, Moran, New York. 1963.

Company and Community: The Responsibilities of Business in Society. E. I. DuPont de Nemours and Company, Public Relations Department, Wilmington, Delaware 19898. 1967. (Free)

THE SUPPORT FUNCTION:

Accounting 10/12 -- Part IV: Business Data Processing Fundamentals. M. A. Freeman, J. M. Hanna, G. Kahn. Gregg Division, McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1968.

Public Relations: Encyclopedia of Advertising. 2nd Edition. I. Graham. Fairchild Publications, Inc., 7 East 12th Street, New York, New York 10003. 1969.

THE ENGINEERING FUNCTION:

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Quality and Reliability Engineering: Quality Control Handbook. 2nd Edition. I. M. Juran. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1962.

THE FACTORY FUNCTION:

Jobs...(Series). Wisconsin Department of Industry, Labor and Human Relations. Wisconsin Occupational Analysis Field Center, 310 Price Place, P.O. Box 2209, Madison, Wisconsin 53701. Title: Jobs in Papermaking.

Bibliography of Papermaking. Publication Sales Department. Technical Association of the Pulp and Paper Industry, 360 Lexington Avenue, New York, New York 10017. 1970.

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CAREER INFORMATION SOURCES:

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Pulp and Paper. Miller Freeman Publications, 500 Howard Street, San Francisco, California 94105. (Monthly)

Paperboard Packaging. Magazines for Industry, Inc., 777 Third Avenue, New York, New York 10017. (Monthly)

PRINTING, PUBLISHING, AND ALLIED INDUSTRIES

This major group includes establishments engaged in printing by one or more of the common processes, such as letterpress, lithography, gravure, or screen; and those establishments which perform services for the printing trade, such as bookbinding, typesetting, engraving, photoengraving and electrotyping.

This major group also includes establishments engaged in publishing newspapers, books, and periodicals, regardless of whether or not they do their own printing.

ACTIVITIES AND EXPERIENCES

In order to increase student awareness of how printing, publishing and allied industries contribute to society, it is suggested that the students and teacher:

1. Consult the primary periodical listings of the school library.

2. Make extensive use of the index of local and national newspapers to locate and scan items of interest.

3. Consult The Dictionary Of Paperback Books In Print and list the number of specialized books available on a topic of interest.

4. Research the number of newspapers that are published in the city and/or state, and try to determine the number of people that read them.

To increase awareness of employment opportunities that are available in the industry, other than in producing books, magazines and newspapers, the student may:

1. Write to private and public agencies for news releases, regulations, and official pamphlets associated with their operations.

2. Visit local merchants and record commercial mail coming into the home to observe the widespread use of advertisements, greeting cards, and business correspondence using printing products and services.

3. Visit the personnel agencies and get a list of jobs available in the printing, publishing and allied products areas.

To simulate job operations and skills required in this industry, it is suggested students:

1. Prepare a bulletin board to display the various parts of a manuscript, such as notations, typewritten form, edited form, typesetting, proofing, binding and distribution mailing.

2. Role play the various categories needed to complete a printing project. Use a short term paper to simulate the printed material as it is processed through composition, editing, proofing, typesetting, binding and distribution.

3. Review an encyclopedia to get an idea of the machinery used in printing. Then construct a printing layout model to depict the letterpress, lithograph, gravure and screen machines as they are actually used.

To gain an insight into the life styles and working conditions of those in the industry, the instructor should:

1. Attend union and professional trade meetings associated with the industry and talk to the various representatives about the industry.

2. Interview personnel managers and get their views relative to the conditions in the various businesses.

3. Visit a printing operation to observe the types of people on the job. Perhaps you could talk to the workers at different locations to realize any differences in conditions.

To acquire experience directly with the skills associated with printing and publishing, students may:

1. Obtain part-time employment in a printing or publishing business.

2. Conduct a structured interview with a personnel director, skilled tradesman, and foreman with respect to the skills associated with success within the industry.

3. Take an industrial arts course in printing and publishing at your school. If none are available, perhaps courses are offered in the evenings through adult education programs.

4. Become active in the publications of your school's newspaper and yearbook.

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THE MANAGEMENT FUNCTION:

Business Pamphlets and Information Sources. Raphael Alexander, Editor. Exceptional Books, Inc., 200 West 27th Street, New York, New York 10019. 1967.

American Business System (R). Ten films, each 16mm, optical sound, B&W, 30 minutes. Rent from: Indiana University Audio-Visual Center, Bloomington, Indiana 47401. Titles are:

1. Role of the Market
2. How it Evolved
3. Technological Development
4. Nation's Resources
5. Market and the Individual
6. Challenge of Management
7. Production and Marketing
8. Financial Management
9. Economic Growth
10. Government and the Market

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The Vocational-Technical Library Collection. Bruce Reinhart. Bro-Dart Publishing Company, Williamsport, Pennsylvania. 1970.

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2. Professional
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Industrialization. Field Enterprises Educational Corporation, Merchandise Mart Plaza, Chicago, Illinois 60654.

CAREER INFORMATION SOURCES:

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EDUCATION RESOURCES INFORMATION CENTER (ERIC):

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RM: Reproduction Methods for Business and Industry. Gellert Publishing Company, 33 West 60th Street, New York, New York 10023. Monthly. $4 per year.

Reproduction Review and Methods. North American Publishing Company, 134 North 13th Street, Philadelphia, Pennsylvania 19107. Monthly. $10 per year.

Book Production Industry. Box 417, Berea, Ohio 44017. Monthly. $10 per year.

Forms and Systems. American Data Processing, Inc., Book Tower, Detroit, Michigan 48226. Monthly. $24 per year.

Greeting Card Magazine. MacKay Publishing Company, 95 Madison Avenue, New York, New York 10016. Monthly. $5 per year.

CHEMICALS AND ALLIED PRODUCTS

This major group includes establishments producing basic chemicals, and establishments manufacturing products by predominantly chemical processes. Establishments classified in this major group manufacture three general classes of products: (1) basic chemicals such as acids, alkalies, salts, and organic chemicals; (2) chemical products to be used in further manufacture such as synthetic fibers, plastics materials, dry colors, and pigments; (3) finished chemical products to be used for ultimate consumption such as drugs, cosmetics, and soaps, or to be used as materials or supplies in other industries such as paints, fertilizers, and explosives. The mining of natural rock salt is classified in mining industries.

ACTIVITIES AND EXPERIENCES

To become more aware of the contributions of chemical production to society, the student should:

1. List the chemicals in daily use in the home. Check areas such as the kitchen, bathroom and garage.

2. Visit a library and trace the use of the chemicals used in cosmetics, foods, and transportation.

3. Attend a class in the school chemistry laboratory and ask the teacher to show the different chemicals used and explain their significance in community and school life.

4. Visit a home economics class and ask the teacher to demonstrate some of the chemical products used in food preparation.

To gain a better understanding of the positive role government plays with respect to the chemical industry, the class should:

1. Locate the local regulating, licensing, and inspecting agencies for the chemical industries. Visit their offices and ask them to explain their role in controlling and assisting chemical producers.

2. Write to appropriate private and public agencies for the specific regulations and guidelines established for the industry with respect to health and safety precautions for the producer and consumer of chemical products.

3. Consult consumer protection agencies and pure food and drug inspectors for information on items of interest to the consumer.

To have a knowledge of the source chemicals from which all processed chemicals flow, it is suggested to:

1. Get a sample of the following natural products and display them for relationships:

clay	nitrogen	potash
coal	oxygen	salt
limestone	petroleum	sulphur
	water	

2. Research the library and list examples of such processes as acids, solvents, and catalysts.

To know the career opportunities with the specific occupational groups in this industry, the following activities are suggested:

a. Visit a chemical plant and talk to the following workers:

unskilled	movers, cleaners, lubricators
semi-skilled	inspectors, clerks, machine operators, maintenance men
skilled	chemical technicians, metal technicians, electrical technicians, data processing technicians
professional	chemists, engineers, supervisors

b. Visit personnel agencies and get a list of job opportunities related to the chemical manufacturing industry.

c. Visit the school records department and try to find out what percentage of students enter the chemical industry and the types of jobs they get.

To get specific experience with the skills needed for a career in the chemical products industry, the instructor or students may:

1. Take a chemistry class and perform necessary experiments using chemicals.

2. Obtain part-time employment in a business that used chemical products in producing other products.

3. Purchase a chemistry set and perform simple chemical experiments such as electrolysis and oxidation.

4. Refine selected chemicals by such operations as washing, grinding, screening and filtering.

5. With supervision, prepare foods that require chemical reactions such as bread making, canning and blending.

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Management Minded Supervision. B. B. Boyd. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1968.

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Service, 135 West 50th Street, New York, New York 10020. 1967. (Free)

THE SUPPORT FUNCTION:

Data Processing: Accounting for Your Future. United Business Schools Association. 1730 M Street, N.W., Suite #401, Washington, D.C. 20036. (Free)

Finance: Directory of Business and Financial Services. Special Libraries Association, 31 East 10th Street, New York, New York 10003.

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Engineering as A Career. 3rd Edition. Ralph J. Smith. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1969.

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Plastics Technology: Basic Materials and Processes. Robert S. Swanson. McKnight and McKnight, Route 66 at Towanda Avenue, Bloomington, Illinois 61701. 1965.

Careers Ahead in the Chemical Industry. Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009. (Free)

Film Guide to Chemicals, Chemistry and the Chemical Industry. Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009. (Free)

Plastics Filmstrips. Society of Plastics Engineers, Philadelphia Section.

CAREER INFORMATION SOURCES:

Career World: The Continuing Guide to Careers. Curriculum Innovations, Inc., 501 Lake Forest Avenue, Highwood, Illinois 60040.

Dutton Career Books Series. E. P. Dutton and Company, 201 Park Avenue South, New York, New York 10003.

Careers: Technician. 16mm, Color, 12 minutes. Doubleday Media, Box 11607, 1307 Reynolds Avenue, Santa Ana, California 92705.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: (1) Chemical Industry; Chemical Technicians, Metallurgical Technicians; (2) Lubricants; or (3) Ceramics.

Chemical and Engineering News. American Chemical Society, 1155 16th Street, N.W., Washington, D.C. 20036. Weekly. $8 per year.

Chemical Processing. Putman Publishing Company, 111 East Delaware Place, Chicago, Illinois 60611. 13 per year. $10 per year.

Soap, Detergents, and Cleaning Preparations, Perfumes, Cosmetics, and Other Toilet Preparations.

Household and Personal Products Industry; the Magazine for the Detergent, Soap, Cosmetic and Toiletry, Wax, Polish, and Aerosol Industries. 4 Second Avenue, Denville, New Jersey 07834. Monthly. $8 per year.

American Point Journal. American Paint Journal, 2911 Washington Avenue, St. Louis, Missouri 63103. Weekly. $5 per year.

Porcelain Enamel Institute Newsletter. 1900 L Street, N.W., Washington, D.C. 20036. Monthly. Free.

Naval Stores Review and Terpene Chemicals. 624 Gravier Street, New Orleans, Louisiana 70130. Monthly. $10 per year.

Agricultural Chemicals. Industry Publications, Inc., P.O. Box 31, Caldwell, New Jersey 07006. Monthly. $4 per year.

Adhesives Age. Palmerton Publishing Company, 101 West 31st Street, New York, New York 10001. Monthly. $8 per year.

Resin News (Incorporating Adhesives and Resins). A. S. O'Conner and Company, Ltd., 26 Sheen Park, Richmond, Surrey, England. Monthly. $6 per year.

PETROLEUM REFINING AND RELATED INDUSTRIES

This major group includes establishments primarily engaged in petroleum refining, manufacturing paving and roofing materials, and compounding lubricating oils and grease from purchased materials. Establishments manufacturing and distributing gas to consumers are classified in public utilities industries, and those primarily engaged in producing coke and by-products.

ACTIVITIES AND EXPERIENCES

To develop an awareness of the importance of the petroleum industry to society:

1. Observe the flow of goods in your home during a week. Identify the products or derivatives of petroleum and the petroleum needs of the delivery systems.

2. Read historical and contemporary periodical accounts of the role petroleum plays in international diplomacy in today's world.

3. Write to transportation agencies for information on the petroleum needs of the carrier and of the world sources.

4. Record the price impact oil products have on everyday products such as gasoline, heating oil and plastics.

To better understand the government's role in regulating the petroleum industry in America, activities may be to:

1. Write to private and public petroleum agencies in Washington, D.C.

2. Survey the attitudes of classmates and their parents toward the concept of an oil depletion allowance.

3. Read current articles about the oil crisis and maintain a file to correlate price changes resulting from oil supply impact.

To become familiar with the job operations associated with the petroleum industry, it is suggested the class:

1. Construct three dimension displays of the exploration, extraction, refining and delivery phases of the industry.

2. Collect samples of liquid, semi-solid and gas petroleum products used as fuels or chemical raw materials such as: crude oil, asphalt, pitch, natural gas.

To become aware of the fact that oil does not wear out in use, reprocess contaminated oil by:

1. Filtering: A cloth lined, sand and gravel filled funnel as a filter.

2. Magnetic purifications: A magnet passed through the filtered oil.

3. Siphoning: After standing, the water can be taken from the bottom of the container.

To experience the working conditions and life styles of those employed in the petroleum industry:

1. Obtain part-time work in a petroleum related operation.

2. Observe the life styles in a community where the majority of jobs are in a petroleum industry.

3. Talk to representatives from the petroleum industry such as management, labor, personnel and union. Ask them to discuss the working conditions in the industry and then compare their attitudes.

To understand some of the management skills associated with the petroleum industry, the instructor should:

1. Secure records from bureaus of records and statistics along with case histories from business or governmental agencies.

2. Interpret and solve problems using this real information from industry.

3. Identify a substantial management decision made in the local community. Interview the decision makers, the workers and consumers to evaluate the process and content of the decision.

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THE MANAGEMENT FUNCTION:

American Economic and Business History Information Sources. Robert W. Lovett, Editor. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1970.

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1. Delegating Work
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4. Personal Problems
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6. Trouble with Women

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Arco Career Guidance Series. Arco Publishing Company, Inc., 219 Park Avenue South, New York, New York 10003. 1960-72.

American Personnel and Guidance Association. 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009.

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Oil and Gas Journal. Petroleum Engineer Publishing Company, 211 South Cheyenne Avenue, Tulsa, Oklahoma 74101.

Paving and Roofing Materials

Asphalt. Asphalt Institute, University of Maryland, College Park, Maryland 20740.

RUBBER AND MISCELLANEOUS PLASTICS

This major group includes establishments manufacturing from natural, synthetic, or reclaimed rubber, gulta percha, balata, or gutta siak, rubber products such as tires, rubber footwear, mechanical rubber goods, heels and soles, flooring and rubber sundries. This group also includes establishments manufacturing or rebuilding retreaded tires, but automobile tire repair shops engaged in recapping and retreading automobile tires are classified in Services. This group also includes establishments engaged in molding primary plastics for the trade, and manufacturing miscellaneous finished plastics products.

ACTIVITIES AND EXPERIENCES

To increase awareness of the contributions of the rubber and miscellaneous plastics industry to society, the following is suggested as student activities:

1. Observe the objects at home that are composed wholly or in part of rubber or plastic.

2. Read about the events in the discovery and use of rubber and plastic in domestic, industrial, military and space applications.

3. Visit an industry that manufactures rubber and plastic and consider the importance of these products as related to other products.

To realize the employment outlook in rubber and plastics, the student may:

1. Review news releases that are concerned with new applications of synthetic resin plastics.

2. Read and discuss the possible impact of foreign competition and environmentally based restrictions on the growth and direction of the industry.

3. Visit personnel agencies and get a listing of jobs open in the rubber and plastics industry.

To gain an insight into the variety and versatility or rubber and plastics, identify the principles for making rubber or plastics, and its characteristics, which are: hard or soft; shed or retain water; retain its shape or stretch; absorb or dissipate heat or other forms of energy.

To get experience in the rubber and miscellaneous plastics industry, the instructor may:

1. Work with the industrial arts instructor to mold or dip articles of rubber or plastic.

2. Visit a plant where rubber articles are being processed.

3. Visit a plant where synthetic rubber or plastic articles are being processed.

To develop an awareness of career ladders in the rubber and plastic industry, students should:

1. Conduct on-site interviews with chemists and engineers working in the industry. (Have them identify the problem solving nature of their work.)

2. Obtain part-time employment in this industry to be able to understand the assembly line operations, safety and health operations, and clerical and support operations under supervision.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Service, 138 W. 50th Street, New York, N.Y. 10020. 1967 (Free)

THE SUPPORT FUNCTION:

Accounting Information Sources. Sale Research Corp., Book Tower, Detroit, Michigan 48226. 1972.

Finance: Bibliography of Publications. Bureau of Business and Economic Research and the American Association of Collegiate Schools of Business. Bureau of Business and Economic Research, University of Oregon, Eugene, Oregon 91403.

Personnel: Personnel Management and Supervision. P.O. Cahoun. Appleton-Century Crafts, 440 Park Avenue South, New York, N.Y. 10016.

Public Relations: Effective Public Relations. 4th Edition. Scott M. Cutlip and Allen H. Center. Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632. 1971.

Sales and Marketing: Career Information: Marketing and Distribution. American Vocational Association. 1510 H. Street, N.W. Washington, D.C. 1970.

THE ENGINEERING FUNCTION

Engineering-The Challenge of the Future. Institute of Electrical and Electronics Engineers, 345 E. 47th Street, New York, N.Y. 10017.

Quality and Reliability Engineering: Total Quality Control. A.V. Feigenbaum. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1961.

THE FACTORY FUNCTION:

General Industry. J.R. Lindbeck, I.T. Lathrop, J.L. Feirer. C.A. Bennett Company, Peoria, Illinois. 1969.

A Class Studies Rubber. (K) Filmstrip, Color. Public Relations Department, Firestones Tire and Rubber Company, Educational Aids Division, 1200 Firestone Parkway, Akron, Ohio. (Free)

Rubber and Tire Production. (Flow Charts) Firestone Tire and Rubber Company, Educational Aids Division, 1200 Firestone Parkway, Akron, Ohio. (Free)

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. U.S. Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE)72-129, Rev. 1972.

Ask for: Rubber and Miscellaneous Plastics.

PERIODICALS:

Plastic Design and Processing. Lake Publishing Corporation, P.O. Box 159, Libertyville, Illinois 60048. (Monthly)

Plastics World. Cahners Publishing Company, Inc., 221 Columbus Avenue, Boston, Massachusetts 02116. (Monthly)

Rubber Age. Palmerton Publishing Company, Inc., 101 West 31st Street, New York, New York 10001. (Monthly)

Rubber World. William O. Murtland, Box 5417, 77 N. Miller Road, Akron, Ohio 44313. (Monthly)

LEATHER AND LEATHER PRODUCTS

This major group includes establishments engaged in tanning, currying, and finishing hides and skins, and establishments manufacturing finished leather and artificial leather products and some similar products made of other materials. Leather converters are also included.

ACTIVITIES AND EXPERIENCES

To increase understanding of how leather goods contribute to society, students may:

1. Read historical accounts of the role leather played in past wars.

2. Study industrial uses of leather, especially belting and power machinery.

3. Send for booklets from the textile, furniture, shoe, luggage, handbag, and glove manufacturers and note the fact that leather sets the standards for each industry.

4. Observe the use of leather in your school and also your home. Make a list of its various uses.

To become aware of the employment outlook within the leather industry, the students may:

1. Research periodical accounts of the growing amount of imported leather and leather products.

2. Review the local newspapers and list the number of jobs advertised for this industry.

3. Visit leather goods retail store and/or factories and ask the personnel manager for their views on future employment.

4. Look up various occupations in publications such as Dictionary Of Occupational Titles.

To identify positively with the field of leather production, it is suggested students:

1. Survey the attitudes of them peer group toward fine leather products.

2. Visit a specialty shoe plant or equipage plant for horses if one is available in the area.

3. Shop at stores that sell leather products. Perhaps to purchase an article made of fine leather and then compare the quality with other similar apparel.

To become familiar with the operations associated with leather tanning or processing students should:

1. Review an encyclopedia on leather processing and with samples, prepare a display of the raw hides to illustrate operations, such as:

   trimming unhairing finishing stretching
   washing tanning fleshing

2. Prepare a similar display of the processing of the finished hides into a piece of footwear. Emphasize operations such as:

   designing patternmaking cutting stitching

3. Identify stages of custom work requiring high craftsmanship.

To gain experience with the skills and operations associated with the leather industry, students may:

1. Ask the art teacher in the school to show how to design footwear, belts, or wallets. Perhaps students may enroll in a class for a longer period of time and experience.

2. Perhaps the teacher can also enroll in an industrial arts class in the processing of leather products.

3. Work with the science teacher to perform some of the chemical operations associated with tanning and glazing of leather.

4. Obtain part-time employment in a leather products enterprise, such as, saddlery shops, shoe repair shops, handbag and wallet shops, or any other leather retail shop. (Perhaps the yellow pages of the local telephone directory will lead to a craftsman shop specializing in leather products.)

To get experience with the working conditions and entry level requirements of a career in the leather industry, students may:

1. Visit a leather tanning or finishing plant. Arrange with management and unions for possible permission to carry out entry level operations under supervision.

2. Arrange for part-time, summer, or short work programs in connection with school study and leather production.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Services, 135 West 50th Street, New York, New York 10020. 1967. (Free)

THE SUPPORT FUNCTION:

Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1972.

Finance: Manpower and Economic Education; Opportunities In American Economic Life. Robert L. Carcy and Phillip E. Powell. Joint Council on Economic Education, 1212 Avenue of the Americas, New York, New York 10036. 1968. Rev. 1972.

Public Relations: An Occupational Guide to Public Relations. Public Relations Society of America, Inc., 845 Third Avenue, New York, New York 10022. 1969.

Sales and Marketing: Sales Promotion I. Thomas. Distributive Education Curriculum Laboratory, The University of Texas, Austin, Texas.

THE ENGINEERING FUNCTION:

A Career of Opportunity (Engineering). National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006. 1967. (Free)

Quality and Reliability Engineering: Quality Planning and Analysis. J.M. Juran and F.M. Gryna, Jr., McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1962.

THE FACTORY FUNCTION:

Automobile Facts and Figures. Automobile Manufacturers Association, 320 New Center Building, Detroit, Michigan 48202. (Free)

Factory Occupations: Employment Outlook. Factory Operatives, Assemblers, Inspectors, etc., Superintendent of Document, U.S. Government Printing Office, Washington, D.C. 20402. Stock #2901-0825.

Materials for Occupational Education: An Annotated Service Guide. Patricia Schieman. R.R. Bowker Company, Order Department, P.O. Box 1807, Ann Arbor, Michigan 48101. 1971.

Leather in the Making. 16mm., Optical Sound, Color, 30 minutes. Brown Shoe Company, Public Relations, 8300 Maryland Avenue, Clayton, Missouri 63105. 1960.

CAREER INFORMATION SOURCES:

Careers After High School. Peter Sandman and Tim Haight. The MacMillan Company. 185 pp.

American Personnel and Guidance Association. 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009.

Careers: Technician. 16mm., Color, 12 Minutes. Doubleday Media, Box 11607, 1307 Reynolds Avenue, Santa Ana, California 92705.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How To Use ERIC. U.S. Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Rev. 1972.

Ask For: Furniture, Leather, Job Skills, Skilled Occupations.

Periodicals: Leather and Shoes. Rumpf Publishing Company, 300 W. Adams Street, Chicago, Illinois 60606. Weekly.

Leather Manufacturer. Shoe Trades Publishing Company, 15 East Street, Boston, Massachusetts 02111. Monthly.

Footwear News. Fairchild Publications, 7 East 12 Street, New York, New York 10003. Weekly.

Handbags and Asscessories. Business Journals, 1133 Broadway, New York, New York 10010. Monthly.

STONE, CLAY, GLASS AND CONCRETE PRODUCTS

This major group includes establishments engaged in manufacturing flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and asbestos products, etc. from materials taken principally from the earth in the form of stone, clay, and sand. When separate reports are available for mines and quarries operated by manufacturing establishments classified in this major group, the mining activities are classified in mining industries; when separate reports are not available, the mining activities are classified herein with the manufacturing operations.

ACTIVITIES AND EXPERIENCES

To gain an insight into the contributions of stone, clay, glass, and concrete products to society, the students should:

1. Survey each room in their home and note the products made wholly or primarily from stone, glass, clay and concrete.

2. List the properties of the materials used and note how the form and function of the item is enhanced by its composition.

3. Research the crucial role these materials play in the electrical and chemical industries.

To better comprehend the role played by stone, clay, and glass in the social development of man, it is suggested that the class:

1. Visit a museum of anthropology and observe man's record of progress in stone, clay, and glass artifacts.

2. Note the ability of these materials to give man artistic expression as well as practical utility.

3. Compare the stone, glass, and clay items used in today's home with that used in early American homes.

To learn the properties of stone, clay, glass, and concrete, students may:

1. Work with the physics and/or chemistry teachers to test the durability of these materials under stress, abrasion, or chemical action.

2. Work with the chemistry teacher and ask for a demonstration of the heat resistance of these materials.

3. Watch a glass blower as different shapes are developed using glass and related materials.

To gain experience with the operations and skill levels associated with the production of clay, glass, stone and concrete products, students may:

1. Visit a construction site and survey the many uses of these materials in construction.

2. Visit a china or pottery factory and trace the process from the mixing of raw materials through the forming, firing, decorating, glazing and finishing phases of production.

3. Obtain part-time employment in any of the factories that manufacture glass, clay, stone or concrete products.

To obtain positively with this field, students can:

1. Interview workers in electrical, chemical, or space industries concerning the progress made possible through the use of these materials.

2. Read, interpret, and solve problems using real information taken from the clay, stone, glass, or concrete industries. Discuss actual solutions with professional workers of the industry.

3. Visit trade show expositions to see and discuss the latest applications of these products to domestic, industrial, military and research concerns.

To stimulate the operations of workers engaged in the production of stone, glass, clay, and concrete articles, teacher and students may:

1. Plan, organize, direct, and evaluate the production of a socially useful and artistically interesting article made from stone, clay, glass, or concrete.

2. Visit in an industrial arts class to use materials of this industry. Perhaps to use these materials to decorate brick or tile products, glaze pottery, or porcelain ware. Melting glass into different shapes may be possible.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Effective Supervision. Didactic Systems, Inc., Box 4, Cranford, New Jersey 07016. Roles: Participants are recently appointed supervisiors in a medium-sized company. Playing time: approximately 3 hours. 3-5 players per team. Number of teams: unlimited.

Technicians and Inspectors in Quality Control. (For information write to American Society for Quality Control, 161 West Wisconsin Avenue, Milwaukee, Wisconsin 53203.)

THE FACTORY FUNCTION:

Materials for Occupational Education: An Annotated Service Guide. Patricia Schuman. R.R. Bowker Company, Order Department, P.O. Box 1807, Ann Arbor, Michigan 48101. 1971. (This book lists 600 organizations, associations, government agencies, and companies which publish instructional materials relating to occupational education.)

THE ENGINEERING FUNCTION:

Engineering Technology Careers. National Council of Technical Schools, 1507 M Street, N.W., Washington, D.C. 20005. 1966. (Free)

Engineering with Glass. (FL) 16mm. Optical Sound. Color. 28 minutes. (Corning Glass) Distributed by: Association Sterling Films, 866 Third Avenue, New York, New York 10022.

Quality and Reliability Engineering: Lead, A Materials for Modern Design. Lead Industries Association, Inc., 292 Madison Avenue, New York, New York 10017. (Free)

CAREER INFORMATION SOURCES:

The Encyclopedia of Careers and Vocational Guidance. William E. Hopke. Doubleday and Company, Inc., 501 Franklin Avenue, Garden City, New York 11530. 1966.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How To Use ERIC. U.S. Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Rev. 1972.

Ask for: Ceramics, Glass, Glazeers, Glasswalls, Windows, Masonry, Prestressed Concrete, Asphalts, Cement Industry.

Asphalt. Asphalt Institute, University of Maryland, College Park, Maryland 20740.

Flat Glass: American Glass Review. Ebel Doctorow Publications, Inc., 1115 Clifton Avenue, Clifton, New Jersey 07013. Monthly. $10.00 per year.

Glass and Glassware, Pressed or Blown and Glass Products, Made of Purchased Glass.

Glass Digest. Ashlee Publishing. 15 East 40th Street, New York, New York 10016. Monthly. $6.00 per year.

Structural Clay Products: Brick and Clay Record. Cahners Publishing Company, 5 South Wabash Avenue, Chicago, Illinois 60603. Monthly. $6.50 per year.

Walls and Ceilings. International Association of Wall and Ceiling Contractors, Construction Center, 215 W. Harrison, Seattle, Washington 98919. Monthly. $3.00 per year.

Abrasive Engineering. Hitchcock Publishing Company, Wheaton, Illinois 60187. Bi-monthly. $7.50 per year.

Abestos. Stover Publishing Company, 131 N. York Road, Willow Grove, Pennsylvania 19090. Monthly. $4.00 per year.

PRIMARY METALS INDUSTRIES

This major group includes establishments engaged in the smelting and refining of ferrous and nonferrous metals from ore, pig, or scrap; in the rolling, drawing, and alloying of ferrous and nonferrous metals; in the manufacture of castings, forgings, and other basic products of ferrous and nonferrous metals; and in the manufacture of nails, spikes and insulated wire and cable. This major group also includes the production of coke.

ACTIVITIES AND EXPERIENCES

To increase knowledge of how primary metal products contribute to society, students may:

1. Research the twenty largest industries in our industrial society. Note the number that make use of primary metals in production.
2. List the basic technologies used in these industries and also the materials from which they are constructed.
3. Relate this industry to the security of our country. (War materials and equipment.)
4. Review an encyclopedia and note the steps used in processing the primary metals.

To gain information of the changing employment opportunities within the primary products industry, students may:

1. Talk to older employees of a primary metal manufacturing plant and ask them to compare the current job requirements with those of the past.
2. Review old newspapers and compare their job advertisements with current day want ads.
3. Research the diverse affect automation has on unskilled, semi-skilled, and professional jobs found within the industry as noted in the Occupational Outlook Handbook.

To better understand the complex system of operations needed to produce standard metal stock for industrial use, students should:

1. Research a library and list the alternative methods of extracting such basic ores as iron, copper, aluminum and magnesium.

2. Review illustrations of the processes used in the industry such as: Purifying, reducing, shaping, and deforming a primary metal. Reshaping into bars, wire, plates, or other similar useful industrial forms.

3. Read about the marketing, promotion, distribution and servicing plans related to ensuring quality and quantity of basic will be available when needed by American industry.

4. Visit a large steel or other primary metal factory and observe the many operations that are used to process the metal.

To become more aware of the career ladders available within the primary metal products industry, students may:

1. Consult trade journals and read about the various jobs available in the industry.

2. Interview union and management representatives to note how a policy of promotion from within is followed industry-wide.

3. Diagram separate job ladders within such departments as maintenance, transportation, machine operation, clerical and research specialities.

4. Visit the personnel department of a large metals manufacturing plant and ask for a job breakdown associated with pay scales for each job step. Perhaps these pay scales can be related to jobs classified by changing environmental conditions in the plant.

To gain experience in the production of standard stock from a primary metal, instructor and students may:

Work with the industrial arts teacher of your school to process metals such as lead. Steps that can be done are:

Melt the lead, remove impurities, construct a one-piece flask to hold a mold pattern, cast the molten lead into a prepared cavity, and roll the cooled lead into sheet rock if possible.

To identify positively with the primary metal products industry, students may:

1. Visit an industrial site to observe first hand the operations performed.

2. Conduct interviews with entry level workers.

3. Where plant policy permits, perform entry level operations of a metal processing plant under direct supervision of a skilled worker.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Supervisors in Action. J.J. Famularo. McGraw-Hill Book Company, 330 W. 42nd Street, New York, New York 10036. 1961.

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Service, 135 W. 50th Street, New York, New York 10020. 1967.

Industrial Management Series. (R) (P) McGraw-Hill Textfilms, 330 W. 42nd Street, New York, New York 10036.

THE SUPPORT FUNCTION:

Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1972.

Money at Work in the Steel Industry. (K) 56 Frames. Color. American Iron and Steel Institute, 1000 - 16th Street, N.W., Washington, D.C. 20036. Rev. 1972.

Personnel: Personnel Management and Supervision. R.P. Calhoon. Appleton-Century-Crafts, 440 Park Avenue South, New York, New York 10016.

Public Relations: An Occupational Guide to Public Relations. Public Relations Society of America, Inc., 845 Third Avenue, New York, New York 10022. 1969.

Sales and Marketing: Career Information: Marketing and Distribution. American Vocational Association. 1510 H. Street, N.W., Washington, D.C. 1970.

THE ENGINEERING FUNCTION:

Engineering As a Career, 3rd Edition. Ralph J. Smith. McGraw-Hill Book Company, 330 W. 42nd Street, New York, New York 10036. 1969.

Quality and Reliability Engineering: Quality Control Handbook. 2nd Edition. J.M. Juran, McGraw-Hill Book Company, 330 W. 42nd Street, New York, New York 10036. 1962.

Controlling Quality is Everybody's Business. (R) 16mm. Optical Sound. Color. 20 Minutes. Rent from: A-V Extension Service, University of Minnesota, 2037 University Avenue, S.W., Minneapolis, Minnesota 55455.

THE FACTORY FUNCTION:

Man, Metals, and Modern Magic. J.G. Parr. American Society for Metals, Cleveland, Ohio. 1958.

Factory Occupations: Employment Outlook. Factory Operatives, Assemblers, Inspectors, Etc. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

American Systems of Manufacturers. Nathan Rosenberg. Aldine Atheron, Inc., 529 S. Wabash Avenue, Chicago, Illinois 60605. 1969.

The Making of Steel. American Iron and Steel Institute, 1000 - 16th Street, N.W., Washington, D.C. 20036.

Industrialization. Field Enterprises Educational Corporation, Merchandise Mart Plaza, Chicago, Illinois 60654.

A Natural. 16 mm. Optical Sound, Color, 19 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

Straight Line to Production - Casting Process. 16mm. Optical Sound. Color, 33 Minutes. Distributor: Gray Iron Founders Society, Inc., National City East 6th Building, Cleveland, Ohio 44114.

Iron and Steel Filmstrips. American Iron and Steel Institute, 1000 16th Street, N.W., Washington, D.C. 20036. Titles include:

> Chemistry of Iron. 35 Frames, Color, Rev. 1971. Raw Materials of Steelmaking. 43 Frames, Color. 1971. Science, Technology and Society. 68 Frames, Color, 1970.

CAREER INFORMATION SOURCES

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How To Use ERIC. U.S. Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Rev. 1972.

Ask for: Metal Industry, Metal Working Occupations, Foundries, Steel Industry, Metallurgy.

Dow Metal Products News. Dow Metal Products Company, Division of Dow Chemical Company, Midland, Michigan 48640. Bi-monthly. Free.

Journal of Metals. American Institute of Mining, Metallurgical and Petroleum Engineers, 345 East 47th Street, New York, New York 10017. Monthly. $24.00 per year.

Metal Progress. American Society for Metals, Metals Park, Ohio 44073. Monthly. $9.00 per year.

Aluminum Scrap and Secondary Ingot. Publications Distribution Section, 4800 Forbes Avenue, Pittsburgh, Pennsylvania 15213. Monthly.

FABRICATED METAL PRODUCTS EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT

This major group includes establishments engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery, general hardware, non-electric heating apparatus, fabricated structural metal products, metal stampings and a variety of metal fabricating industries are classified in other major groups.

ACTIVITIES AND EXPERIENCES

To gain insight into the contributions of the fabricated metals industry to society, it is suggested that students:

1. Scan consumer catalogues to list the percentage of items offered for sale that are composed wholly or in part of fabricated metals.

2. Visit a local museum to trace the history of metallurgy and the types of industrial equipment produced or improved by the application of metal fabrication.

3. Observe the local community and note the use of metal in law enforcement, fire science and internal justice.

4. Review accounts of the last wars this country was involved with and list the ways metal was used in the defense of the nation.

To become aware of the changing opportunities for employment within the fabricated metals industry, students may:

1. Check with local metal fabricators and personnel agencies to determine the change in needs of employment in this industry.

2. Consult the Dictionary Of Occupational Titles for appropriate listings. Compare this list with that of a ten-year old edition of the same book.

3. Send for illustrated booklets from major American corporations that describe the products and processes central to the corporation. Public relations, sales, and information departments of these corporations are all good sources of such information.

To better understand the three basic processes involved in the fabrication of metals:

1. Work with the industrial arts teacher to cast or mold a product from stock metals.

2. Work with the industrial arts teacher to compress or stretch stock metal into a useful form.

3. Observe the steps required to condition metals in the school's metal shop. Conditioning can be done by heating, chemical treatment or mechanical alterations.

In order to identify positively with the field of fabricated metals, students may:

1. Work with industrial arts metal teacher and also at home to prepare and/or observe metal objects such as: containers, hardware, heating and plumbing fixtures, structural products, fasteners, stamping, coating and engraving products, wire products and foil and leaf products.

2. Visit a metal fabrication shop and observe for a period of time the worker activities.

To gain experience within the fabricated metals industry, students may:

1. Fabricate a useful object from metal by working with the industrial arts teacher and utilizing one of more of the prescribed methods.

2. Obtain a part-time job within the industry. This could be a fabrication shop, metals factory or retail metal stores.

3. Visit a metals fabrication factory. Perhaps, under supervision, you will be able to participate in entry level work projects.

To become experienced with the employment outlook and specific job operations within the fabricated metals industry, students and teacher may:

1. Attend professional and union meetings. Topics of interest to class could be discussed.

2. Visit a metals factory and talk to the workers in the field to get their impression of the future of the industry.

3. Review books with case studies about actual experiences in the metals industry. From the cases, break down the needed skills into categories such as manipulation, recall, discrimination and problem solving.

4. Review the appendix for references to the career information related to this industry.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Business Principles, Organization, and Management. H. A. Tonne, S. I. Simon, E. C. McGill, 2nd Edition. Gregg Division, McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1963.

THE SUPPORT FUNCTION:

A Career As A Certified Public Accountant. American Institute of CPA's, 666 Fifth Avenue, New York, New York 10017. 1968. (Free)

Finance: Money at Work in the Steel Industry. (K) 56 Frames. Color. American Iron and Steel Institutes, 1000 16th Street, N.W., Washington, D.C. 20036. Revised 1972. (Free)

Legal: Applied Business Law: Business Law Applied to the Problems of the Individual as Citizen, Consumer and Employee. M. Fisk, and J. C. Snapp. Southwestern Publishing Company, 5101 Madison Road, Cincinnati, Ohio 45227. 1966.

Personnel: Personnel Management. M. I. Jucium. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430. 1967.

Public Relations: An Occupational Guide to Public Relations. Public Relations Society of America, Inc., 845 Third Avenue, New York, New York 10022. 1969.

Sales and Marketing: Advertising. M. Clarke. Distributive Education Curriculum Laboratory, The University of Texas, Austin, Texas 78712. 1963.

THE ENGINEERING FUNCTION:

A Career of Opportunity (Engineering). National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006. 1967.

Careers in Metallurgy and Metallurgical Engineering. The Metallurgical Society of AIME, 34 East 47th Street, New York, New York 10017. 1969.

Quality and Reliability Engineering: Quality Planning and Analysis. J. M. Juran and F. M. Gryna, Jr. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1962.

THE FACTORY FUNCTION:

Man, Metals, and Modern Magic. J. G. Parr. American Society for Metals. Cleveland, Ohio. 1958.

Manufacturing Man and His Job. Robert E. Finley and Henry R. Miobio. American Management Association, Inc., 135 West 50th Street, New York, New York 10020. Retail orders to: MacMillan Company, 866 Third Avenue, New York, New York 10022. 1966.

Lead, A Material for Modern Design. Lead Industries Association, Inc., 292 Madison Avenue, New York, New York 10017. (Free)

A Natural. 16mm. Optical Sound. Color, 19 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

Precision Toolmaking and Machining. 16mm. Optical Sound. Color. 25 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

Challenge and Change. (K) 35mm Filmstrip with Sound and Script. Aluminum Association, 750 Third Avenue, New York, New York 10017. 1971. (Free)

Iron and Steel Filmstrips. (From American Iron and Steel Institute.) Titles are: Chemistry of Iron. 35 Frames, Color, Revised 1971. Raw Materials of Steelmaking. 43 Frames, Color, 1971. Science, Technology and Society. 68 Frames, Color, 1970.

CAREER INFORMATION SOURCES:

Careers After High School. Peter Sandman and Tim Haight. The MacMillan Company. 185 pp.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How To Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Metal Industry, Metal Working Occupations, Foundries, Steel Industry, Metallurgy.

Periodicals:

Cutlery, Hand Tools, and General Hardware:

Hardware Age. Chilton Company, Chilton Way, Radnor, Pennsylvania 19089. Bi-Weekly. $2.00 per year.

Hardware Consultant. National Builders' Hardware Association. 1290 Avenue of the Americas, New York, New York 10019. Monthly. $5.00 per year.

Hardware Merchandiser. Irving Cloud Publishing Company, 7300 North Cicero Avenue, Chicago, Illinois 60646. Monthly. $15.00 per year.

Chain Saw Industry and Power Equipment Dealer. Chain Saw Industry Press, Inc., P.O. Box 1703, Shreveport, La. 71102. Bi-Monthly. $3.00 per year.

Journal of Plumbing, Heating, and Air Conditioning. Scott Periodicals Corporation, 92 Martling Avenue, Tarrytown, New York 10591. Monthly. $5.00 per year.

Boilermaker. Nooter Corporation, 1400 South Third Street, St. Louis, Missouri 63166. Quarterly. Free (Manufacturers House Organ).

Plating. American Electroplater, 56 Melmore Gardens, East Orange, New Jersey 07017. Monthly. $16.00 per year.

MACHINERY, EXCEPT ELECTRICAL

This major group includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment and transportation equipment. Machines powered by built-in or detachable motors ordinarily are included in this major group, with the exception of electrical household appliances. Portable tools, both electric and pneumatic powered, are also included in this major group.

ACTIVITIES AND EXPERIENCES

To increase your understanding of the contribution that the production of non-electrical machinery makes to society, students should:

1. Read historical and/or fictional accounts of the dramatic events of America's development that introduces new forms of machinery.

2. Review an index of sixteen millimeter films to locate and preview visuals that portray the story of farm, mining, manufacturing, and computer processing that emphasize the utilization of special tools.

To identify with the non-electrical machinery field, students and teacher may:

1. Read about early experiences within the machine production or operation field.

2. Visit museums of transportations, science or technology to trace the development of engines, farm, oil field and construction machinery.

3. Classify the types of machines observed into special machinery useful to a limited number of industries, and general industrial machinery, useful wherever industrial processes are in progress.

To more readily comprehend the scope of non-electrical machinery production, students may:

1. Identify machines that are demanded in industry.

2. Simulate the marketing, promotion, selling, and distributing and servicing of non-electrical machinery.

To gain knowledge of the changing employment opportunities within the field of non-electrical machine production, students or teacher may:

1. Classify the skill level required of the people engaged in each of the stages from design to servicing.

2. Explore the specific opportunities in the non-electrical machinery field.

3. Make models of the relationship of increased production per worker due to machine improvement, and increased purchasing power and consumption of the workers.

4. Visit personnel offices of non-electrical machinery manufacturing plants and ask for the job requirements, past and present, of the non-electrical machinery manufacturers.

To gain actual experience with the field of non-electrical machine production, students may:

1. Observe a tool and die maker, a pattern maker, a machine tool operator, tool cutter, or machine repairman on site.

2. Perform entry level tasks in the school industrial arts machinery department.

3. Observe a worker in a non-electrical machinery operation. Carefully note the skills required, and working conditions.

4. Obtain part-time employment in a shop that distributes and/or repairs non-electrical machinery.

To be informed of the government's role in the non-electrical machine production, it is suggested students:

1. Interview management on the impact of an increase or decrease of government spending by the military or such as NASA or AEC, on the production of machinery.

2. Perform primary inspections of plant and output for meeting federal or state standards for pollution, health, safety and noise levels.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Manufacturing Management and Control. Dean S. Ammer. Appleton-Century Crafts, 440 Park Avenue South, New York, New York 10016. Illustrated.

Invitation to Achievement - Your Career in Management. American Management Association, Management Information Service, 135 West 50th Street, New York, New York 10020. 1967.

American Business System. (R) Ten Films, each 16mm. Optical Sound, B&W, 30 minutes. Rent from Indiana University Audio-Visual Center, Bloomington, Indiana 47401.

Effective Supervision. Didactic Systems, Inc., Box 4, Cranford, New Jersey 07016.

THE SUPPORT FUNCTION:

Computers and the Mind of Man. (R) Each film is 16mm. Optical Sound, Color, 29 minutes. Indiana University Audio-Visual Center, Bloomington, Indiana 47401.

Finance: Economics for the Concerned Citizen. (R) Each film 16mm. Optical Sound, B&W, 29 minutes. Rent from Indiana University Audio-Visual Center, Bloomington, Indiana 47401.

Personnel: Personnel Management. M. I. Jucium. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430. 1967.

Public Relations: Public Relations - A Guide to Information Sources. Alice Norton. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1970.

Sales and Marketing: Advertising. M. Clarke. Distributive Education Curriculum Laboratory, The University of Texas, Austin, Texas 78712. 1963.

Sales Promotion. I. Thomas. Distributive Education Curriculum Laboratory, The University of Texas, Austin, Texas 78712.

THE ENGINEERING FUNCTION:

ASTM List of Publications. American Society for Testing and Materials. 1916 Race Street, Philadelphia, Pennsylvania. (Free)

A Career of Opportunity (Engineering). National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006. 1967. (Free)

Design for Manufacture. 16mm. Optical Sound. Color. 24 minutes. 1962 (R). Distributed by: Audio-Visual Services, Penn State University, 7 Willard Building, University Park, Pennsylvania 16802. (Rental)

Quality and Reliability Engineering: Controlling Quality is Everybody's Business. (R) 16mm. Optical Sound. Color, 20 minutes. Rent from: A-V Extension Service, University of Minnesota, 2037 University Avenue, S.W., Minneapolis, Minnesota 55455.

THE FACTORY FUNCTION:

The Industrial Worker. (P) 16mm. Optical Sound, Color, 17 minutes. Distributor: Encyclopedia Britannica Film Corporation, 425 North Michigan Avenue, Chicago, Illinois 60611.

World of Automated Assembly. (FL) 16mm. Optical Sound, Color, 17 minutes. Gilman Engineering and Manufacturing Company, 305 West Dilavan Street, Junesville, Wisconsin 53545. 1970.

The Rise of Industrial America. (P) (Series) All films 16mm. Optical Sound, Color. Distributor: Encyclopedia Britannica Educational Corporation, 425 North Michigan Avenue, Chicago, Illinois 60611.

Manufacturing: Strategy for Growth and Change. Thomas A. Faulhaber. American Management Association, Inc., 135 West 50th Street, New York, New York 10020.

Precision Toolmaking and Machining. 16mm. Optical Sound, Color, 25 minutes. Distributor: Modern Talking Picture Services, 1212 Avenue of the Americas, New York, New York 10036.

CAREER INFORMATION SOURCES:

Career World: The Continuing Guide to Careers. Curriculum Innovations, Inc., 501 Lake Forest Avenue, Highwood, Illinois 60040.

Career in Industry, Machine Trades, Skilled Services. American Personnel and Guidance Association, 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0296. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Machinery Industry, Machine Tools, Tool and Die Makers, Machine Tool Operator, Machinists Mechanics.

Farm and Power Equipment. NRFEA Publications, Inc., 2340 Hampton Avenue, St. Louis, Missouri 63139. Monthly. $3.50 per year.

Implement and Tractor. Intertec Publishing Company, 1014 Wyandotte Street, Kansas City, Missouri 64105. Semi-Monthly. $3.00 per year.

Construction Methods and Equipment. McGraw-Hill, 1221 Avenue of the Americas, New York, New York 10020. Monthly. $5.00 per year.

Office Appliances. Business Press International Inc., 288 Park Avenue West, Elmhurst, Illinois 60126. Monthly. $3.00 per year.

Vending Machines. United States Bureau of the Census. (Current Industrial Reports Series No. M35U.) Washington, D.C. 20233. Annual. $1.25.

ASHRAE Journal. American Society of Heating, Refrigeration and Air Conditioning Engineers, 345 East 47th Street, New York, New York 10017. Monthly. $10.00 per year.

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

This major group includes establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation and utilization of electrical energy. The manufacture of household appliances is included in this group, but not industrial machinery and equipment powered by built-in or detachable electric motors.

ACTIVITIES AND EXPERIENCES

In order to understand how electrical machinery contributes to society, students may:

1. Survey their home and list the many applications of electricity such as wiring, radio, television, washers, dryers, blenders and other household appliances.

2. Visit the library to locate and understand how the services listed above were performed before the introduction of electricity into the home.

3. Visit a science and technology museum to view the early developments and recent applications of electricity in the home, industry, military and space fields.

To better understand the changing employment opportunities within the electrical machinery industry, it is suggested students:

1. Review periodical listings in the library to locate trade magazines and pamphlets. Use these and similar sources to estimate the effect military and space cutbacks will have on the industry.

2. Talk with personnel directors, union representatives, employment personnel and other knowledgeable persons to gain an impression of the effect of environmental control devices and intellectronic demands on changing employment opportunities.

To gain some basic knowledge of the operations and skill levels associated with the installation and repair of electrical equipment, students may:

1. Work with the science teacher in the use of old parts of electrical motors and generators to grasp the principles of electricity involved.

2. Troubleshoot a piece of electrical equipment and repair it under supervision.

3. Construct a circuit board. Use a voltmeter and continuity tester to check for possible malfunctions such as a weak battery, faulty switch, or broken wire.

To better understand the basic principles used in the electrical machinery industry, students may:

1. Visit companies that manufacture electrical machinery and/or discuss the principles with employment office personnel.

2. Visit libraries and read brochures of businesses in the industry that explain company principles.

3. Discuss company business philosophies and practices with employees related to this industry.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Manufacturing Management and Control. Dean S. Ammer. Appleton-Century-Crafts, 440 Park Avenue South, New York, New York 10016. Illustrated.

American Business System. (R) Ten films, each 16mm. optical sound, B&W, 30 minutes. Rent from Indiana University Audio-Visual Center, Bloomington, Indiana 47401.

THE SUPPORT FUNCTION:

Accounting Information Sources. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1972.

Finance: Manpower and Economic Education. Opportunities in American Economic Life. Robert L. Darcy and Phillip E. Powell. Joint Council on Economic Education, 1212 Avenue of the Americas, New York, New York 10036. 1968. Revised 1972.

Personnel: Personnel Management. M. I. Jucias. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430. 1967.

Public Relations: Public Relations - A Guide to Information Sources. Alice Norton. Gale Research Corporation, Book Tower, Detroit, Michigan 48226. 1970.

Sales and Marketing: Career Information: Marketing and Distribution. American Vocational Association, 1510 H Street, N.W., Washington, D.C. 1970.

THE ENGINEERING FUNCTION:

Mechanical Engineering: The Sources of Information. The Shoe String Press, Inc., 995 Sherman Avenue, Hermden, Connecticut 06514.

Should You Be A Manufacturing Engineer. American Society of Tool and Manufacturing Engineers, 20501 Ford Road, Dearborn, Michigan 48128. (Free)

Design for Manufacture. 16mm. Optical sound, color, 24 minutes. 1962 (R). Distributed by: Audio-Visual Services, Penn State University, 7 Willard Building, University Park, Pennsylvania 16802. (Rental)

Quality and Reliability Engineering: Quality Planning and Analysis. J. M. Juran and F. M. Gryna, Jr. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1962.

Controlling Quality is Everybody's Business. (R) 16mm. Optical sound, color, 20 minutes. Rent from: A-V Extension Service, University of Minnesota, 2037 University Avenue, S.W., Minneapolis, Minnesota 55455.

THE FACTORY FUNCTION:

Basic Instrumentation: Industrial Measurement. Patrick O'Higgins. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1966.

Man, Metals, and Modern Magic. J. G. Parr. American Society for Metals. Cleveland, Ohio. 1958.

Factory Occupations: Employment Outlook. Factory Operatives, Assemblers, Inspectors, etc. Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402. Stock No. 2901-0825.

The Industrial Worker. (P) 16mm. Optical sound, color, 17 minutes. Distributor: Encyclopedia Britannica Film Corporation, 425 North Michigan Avenue, Chicago, Illinois 60611.

World of Automated Assembly. (FL) 16mm. Optical sound, color, 17 minutes. Gilman Engineering and Manufacturing Company, 305 West Dilavan Street, Janesville, Wisconsin 53545. 1970.

American Systems of Manufacturers. Nathan Rosenberg. Aldine Atherton, Inc., 529 South Wabash Avenue, Chicago, Illinois 60605. 1969.

Industrialization. Field Enterprises Educational Corporation, Merchandise Mart Plaza, Chicago, Illinois 60654.

Precision Toolmaking and Machining. 16mm. Optical sound, color, 25 minutes. Distributor: Modern Talking Picture Services, 1212 Avenue of the Americas, New York, New York 10036.

CAREER INFORMATION SOURCES:

Industrial Careers Kit and Business Careers Kit. Careers, Inc., P.O. Box 135, Fargo, Florida 33540.

The Encyclopedia of Careers and Vocational Guidance. William E. Hopke. Doubleday and Company, Inc., 501 Franklin Avenue, Garden City, New York 11530. 1966. 2 volumes.

Careers in Industry, Machine Trades, Skilled Services. American Personnel and Guidance Association, 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Electrical Machinery, Machinery, Industry, Electrical Occupations, Electromechanical Technology.

Lighting. Better Light/Better Sight Bureau, 90 Park Avenue, New York, New York 10016. Bi-Monthly. $2.00 per year.

Lighting Design and Application. Illuminating Engineering Society, 345 East 47th Street, New York, New York 10017. Monthly. $25.00 per year.

Radio and Television Weekly. S. E. Davis, 145 Avenue of the Americas, New York, New York 10013. Weekly. $10.00 per year.

Communications Equipment and System Design. Communications Trends, Inc., 1815 Franklin Avenue, Valley Stream, New York 11581. Monthly. $20.00.

TRANSPORTATION EQUIPMENT

This major group includes establishments engaged in manufacturing equipment for transportation of passengers and cargo by land, air and water. Important products produced by establishments classified in this major group include motor vehicles, aircraft, ships, boats, railroad equipment and miscellaneous transportation equipment such as motor cycles, bicycles and horse drawn vehicles.

ACTIVITIES AND EXPERIENCES

To increase your knowledge of how the transportation industry contributes to society, students may:

1. Review the developments made in air, land and sea vehicles since 1900.

2. Visit a museum of science and technology to observe vehicles that span the development during this century.

3. Talk with older citizens and ask them to recall the transportation changes during their lifetime.

4. Visit automobile agencies and get a count of automobiles sold in a year.

5. Visit air, bus, and railroad terminals and compare the amount of passengers during the past year.

To identify with the field of transportation, the class should:

1. Note the flow of goods and services into and from your school during a two week period.

2. Visit garages, automobile inspection stations, and state regulatory agencies to learn how supportive operations make it possible to keep vehicles in operation.

3. Visit local transportation agencies to experience the use of electronic data processing equipment to the support of transport vehicles such as: inspection, scheduling, routing and inventory control.

4. Visit an automobile factory and observe the types of jobs associated with the assembly line.

To gain experience in this industry, students may:

1. Get involved with your school's flow of goods and services by helping the employees working in this area.

2. Obtain part-time employment in a garage, automobile factory, bus terminal or railroad terminal.

3. Volunteer to help in moving goods and services for groups such as churches, schools, scouts and other charities.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Management (R) or (P) -- Part II of Automation. 16mm Optical sound, B&W, 24 minutes. Distributor: McGraw-Hill Textfilms, 330 West 42nd Street, New York, New York 10036.

THE SUPPORT FUNCTION:

Computers and the Mind of Man. (R) Each film is 16mm. Optical sound, color, 29 minutes. Indiana University Audio-Visual Center, Bloomington, Indiana 47401. Titles are:

1. Logic by machine
2. Universe of numbers
3. Universal machine
4. The Control Revolution
5. Manager and Models
6. Engine at the Door

Finance: Personnel Management and Supervision. R. P. Calhoon. Appleton-Century-Crafts, 440 Park Avenue South, New York, New York 10016.

Public Relations: An Occupational Guide to Public Relations. Public Relations Society of America, Inc., 845 Third Avenue, New York, New York 10022. 1969.

Sales and Marketing: Career Information: Marketing and Distribution. American Vocational Association, 1510 H Street, N.W., Washington, D.C. 1970.

THE ENGINEERING FUNCTION:

A Career of Opportunity (Engineering). National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006. 1967. (Free)

Engineering Technology Careers. National Council of Technical Schools. 1507 M Street, N.W., Washington, D.C. 20005. 1966.

Engineering With Glass. (FL) 16mm, optical sound, color, 28 minutes. (Corning Glass) Distributed by: Association Sterling Films, 866 Third Avenue, New York, New York 10022.

Quality and Reliability Engineering: Statistical Quality Control. E. L. Grant. 3rd Edition. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1964.

Reliability Principles and Practices. S. R. Calabio. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1962.

THE FACTORY FUNCTION:

Basic Instrumentation: Industrial Measurement. Patrick O'Higgins. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1966.

Automobile Facts and Figures. Automobile Manufacturers Association, 320 New Center Building, Detroit, Michigan 48202. (Free)

Factory Occupations: Employment Outlook. Factory Operatives, Assemblers, Inspectors, etc. Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402. Stock No. 2901-0825.

Story of Oil and Gas. Phillips Petroleum Company, Editorial Division, 467 Adams Building, Bartlesville, Oklahoma 74063. (Free)

Manufacturing Man and His Job. Robert E. Finley and Henry R. Ziobio. American Management Association, Inc., 135 West 50th Street, New York, New York 10022. 1966.

The Industrial Worker. (P) 16mm, optical sound, color, 17 minutes. Distributor: Encyclopedia Britannica Film Corporation, 425 North Michigan Avenue, Chicago, Illinois 60611.

It's Your Move. (FL) 16mm, optical sound, color, 24 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

Right Hand of Plenty, The. (FL) 16mm, optical sound, color, 23 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

World of Automated Assembly. (FL) 16mm, optical sound, color, 17 minutes. Gilman Engineering and Manufacturing Company, 305 West Delavan Street, Janesville, Wisconsin 53545. 1970. (Free Loan)

CAREER INFORMATION SOURCES:

American Management Association Information Service. 135 West 50th Street, New York, New York 10020. Section II - Sources of Information on Specific Careers.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from Superintendent of Documents, Government Printing Office, Washington, D.C.

20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Automobile Assembly, Lubricants, Transportation.

Automotive Industries. Automotive Industries International, Chilton Way, Radnor, Pennsylvania 19089. Monthly. $5.00 per year.

Auto Truck Parts Digest. National Auto and Truck Wreakers Association, 18 Second Avenue, San Mateo, California 94402. Monthly.

Automotive International Information. Motor Vehicle Manufacturers Association, 320 New Center Building, Detroit, Michigan 48202. Quarterly. (Free)

Trailer-Body Builders. Tunnel Publications, Inc., 1602 Harold Street, Houston, Texas 77066. Monthly. Controlled Circulation.

Flight Magazine. Box 2411, Jacksonville, Florida 33203. Monthly. $12.00 per year.

Boating Industry. Conover-Mast Division, Cahners Publishing Company, 205 East 42nd Street, New York, New York 10017. Monthly. $15.00 per year.

Modern Railroads. Watson Publications, Inc., Subsidiary of Cahners Publishing Company, 5 South Wabash, Chicago, Illinois 60603. Restricted Circulation.

Railway Truck and Structures. Simmons Boardman. Monthly. $3.00 per year.

American Bicyclist and Motorcyclist. Cycling Press, Inc., 461 Eighth Avenue, New York, New York 10001. $6.00 per year.

PROFESSIONAL, SCIENTIFIC AND CONTROL INSTRUMENTS

This major group includes establishments engaged in manufacturing mechanical measuring, engineering, laboratory, and scientific research instruments; optical instruments and lenses; surgical, medical and dental instruments, equipment and supplies; ophthalmic goods, photographic equipment and supplies; and watches and clocks.

ACTIVITIES AND EXPERIENCES

To gain an insight into the role of government in the precision instrument industry, students should:

1. Write to corporations and government bureaus to identify regulatory licensing and measurement standards.

2. Visit local firms that manufacture precision instruments and ask them what types of government contracts they have.

3. Check with area professional groups and talk with the various attendees. Perhaps students may join as a student member and share the activities related to instrumentation.

4. Save news releases, sales information and other data that relates to industries that emanate from governmental contracts.

To identify with the field of precision instruments production, students may:

1. Visit a museum of science and industry to review the history of development of navigational, photographic and surgical instruments.

2. Read accounts of events associated with the invention, production and use of precision instruments.

3. Interview technical and professional people in the community with emphasis on accomplishments made possible through the skilled use of professional, scientific, and control instruments.

SOURCES OF INFORMATION

THE MANAGEMENT FUNCTION:

Company and Community: The Responsibilities of Business in Society. E. I. DuPont de Nemours and Company, Public Relations Department, Wilmington, Delaware 19898. 1967. (Free)

Industrial Management Series. (R) (P) McGraw-Hill Textfilms, 330 West 42nd Street, New York, New York 10036. Titles are:

1. Delegating Work
2. Enforcing Rules and Procedures
3. Hidden Grievance
4. Personal Problems
5. Personality Conflict
6. Trouble with Women

THE SUPPORT FUNCTION:

Computers and the Mind of Man. (R) Each film is 16mm, optical sound, color, 29 minutes. Indiana University Audio-Visual Center, Bloomington, Indiana 47401. Titles are:

1. Logic of Machine
2. Universe of Numbers
3. Universal Machine
4. The Control Revolution
5. Manager and Models
6. Engine at the Door

Public Relations: An Occupational Guide to Public Relations. Public Relations Society of America, Inc., 845 Third Avenue, New York, New York 10022. 1969.

Sales and Marketing: Sales Promotion. I. Thomas. Distributive Education Curriculum Laboratory, The University of Texas, Austin, Texas.

Career Information: Marketing and Distribution. American Vocational Association. 1510 H Street, N.W., Washington, D.C. 1970.

THE ENGINEERING FUNCTION:

Engineering As A Career. 3rd Edition. Ralph J. Smith. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1969.

Quality and Reliability Engineering: Inspection and Gaging. 2nd Edition. The Industrial Press, New York, New York. 1951.

Maintaining Quality Standards. 16mm. (R) Optical sound, B&W, 10 minutes. Available from A-V Extension Service, University of Minnesota, 2037 University Avenue, S.W., Minneapolis, Minnesota 55455.

THE FACTORY FUNCTION:

The Testing and Inspection of Engineering Materials. 3rd Edition. Harmer and Davis and Others. McGraw-Hill Book Company, 330 West 42nd Street, New York, New York 10036. 1964.

Education Materials Catalog. Can Manufacturers Institute. 821 15th Street, N.W., Washington, D.C. 20005. (Free)

World of Automated Assembly. (FL) 16mm, optical sound, color, 17 minutes. Gilman Engineering and Manufacturing, 305 West Delaven Street, Janesville, Wisconsin 53545. 1970. (Free Loan)

The Common Denominator. 16mm, optical sound, color, 30 minutes. Distributor: Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York 10036.

CAREER INFORMATION SOURCES:

Industrial Careers Kit, and Business Careers Kit. Careers, Inc., P.O. Box 135, Largo, Florida 33540.

American Personnel and Guidance Association. 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009. Titles are: Careers in Industry, Careers in Machine Trades, Careers in Skilled Services.

EDUCATION RESOURCES INFORMATION CENTER (ERIC):

How to Use ERIC. United States Office of Education, National Institute of Education. Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Stock No. 1780-0796. DHEW Publication No. (OE) 72-129, Revised 1972. Ask for: Electrical Appliances, Electrical Occupations, Electromechanical Technology, Electronics and Electronics Industry, Measuring Instruments, Instrumentation.

CAREER INFORMATION SOURCES:

American Management Association, Management Information Services, 135 West 50th Street, New York, New York 10020. Sources of Information About Careers. (Typewritten, 28 pp., free) This list is arranged by categories as reflected in the following headings:

Section I - General Sources of Career Information
Section II - Sources of Information on Specific Careers
Section III - Summer Jobs and Teenage Employment
Section IV - International Job Opportunities
Section V - Materials for Career Guidance Counselors
Section VI - Job Seeking Strategy and Methods

American Personnel and Guidance Association, National Career Information Center, 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009. Career Resource Bibliography. Monthly, except June and July. $150.00 per year to members, $25.00 to non-members. One document of particular pertinence to this curriculum is Volume 2, No. 4, February, 1974, titled "Careers in Manufacturing and Industry." Sources and documents are listed under these headings:

Books and Pamphlets - Government Publications
Films, Filmstrips and Cassettes - Commercial Publishers

This organization also publishes a Bibliography of Current Career Information, at $2.00.

B'nai B'rith Career and Counseling Service, 1641 Rhode Island Avenue, N.W., Washington, D.C. 20036, has many useful items, which are available for purchase. There is one free item which is quite useful for use as a nucleus or to supplement career information files. It is titled A "Starter File" of Free Occupational Literature," by Irving Eisen and Leonard H. Goodman, edited by Norman Feingold. Listed in this document are 130 pamphlets which are available free, on a single-copy basis; most of them are from professional societies or trade associations.

California Occupational Guides. Department of Human Resources Development, Research and Statistics, 800 Capitol Mall, Sacramento, California 95814. Write for list of guides, approximately 25 of which are applicable to the manufacturing field. A single copy of each is free.

Forrester, Gertrude. Occupational Literature: An Annotated Bibliography. H. W. Wilson Company, 950 University Avenue, Bronx, New York 10452. 619 pp. This is the latest edition of one of the standard works in the field. It lists over 6,500 items, including books, pamphlets, and government publications. Arrangement is alphabetically by job titles; includes D.O.T. codes, gives educational information where applicable.

National Association of Trade and Technical Schools, 2021 L Street, N.W., Washington, D.C. 20036. Send for their Directory of Accredited Private Trade and Technical Schools. These "proprietary" schools often provide training which is more narrowly task-oriented for those who, for one reason or another, do not wish to become involved in an Associate Degree program, or who need only certain types of skill upgrading or refreshing.

United States Government documents: Some of the most useful ones, such as the Occupational Outlook Handbook and its supplementary Occupational Outlook Quarterly, have been described elsewhere in this Resource Guide. It is prudent to point out, however, that many other documents are available, particularly from the United States Department of Labor. Catalogs are free from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402.

The Job Family Series. Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611. Each 44 pages, $1.50 for individual booklets, $24.25 for the set. These twenty booklets are in accordance with the gross classification scheme of the D.O.T., such as Clerical Jobs, Technical Jobs, etc.

VGM Opportunities In. Vocational Guidance Manuals, 235 East 45th Street, New York, New York 10017. Cloth bound $3.75, paper $1.95. This series covers 62 different occupations in separate books. Those of major interest here are on accounting; market research; sales; public relations; and environmental sciences. Lists educational requirements, job opportunities, educational institutions, and other information.

Career Briefs and Summaries. Careers, Inc., P.O. Box 135, Largo, Florida 33540. $21.60 per year, or 20¢ each for individual summaries, 35¢ for briefs. This is a set of 110 up-to-date career items, issued monthly during the school year. Coverage ranges from non-skilled through semi-skilled to the semi-professional, technical, and professional occupations.

Career Information Monographs. World Trade Academy Press, 50 East 42nd Street, New York, New York 10017. Approximately $1.50 per booklet. A series of monographs covering individual fields and the specialties within each. Includes coverage of the work, training, advancement potential, working conditions, and educational opportunities, including scholarship and fellowship information. Each monograph has a bibliography, about 20 pages.

Occupational Brief Library. Finney Company, 3350 Gorham Avenue, Minneapolis, Minnesota 55426. Includes briefs on many manufacturing occupations, in supportive as well as skill areas.

The Sextant Series for Exploring Your Future. Sextant Systems, Inc., P.O. Box 4866, Milwaukee, Wisconsin 53215. Complete set $196.50. Job descriptions, educational requirements, experience, potential for advancement, and the other usual coverage. The outstanding feature of this series is a self-administered personal profile which allows the student to compare his own personal preferences and aptitudes to those of the occupation. Among the 16 volumes are Graphic Arts and Publishing; Manufacturing/Salaried; Manufacturing/Wage; and Professions. Complete set includes Instructor's Manual, wall charts, cross index, and forms for the profiles.

Concise Handbook of Occupations. J. G. Ferguson Publishing Company, 6 North Michigan Avenue, Chicago, Illinois 60602. Single-page descriptions of over 300 of the most popular jobs. Each covers the type of work, personal qualifications, educational requirements, salary ranges potential for advancement, and long-range outlook.

Encyclopedia of Careers and Vocational Guidance. J. G. Ferguson Publishing Company. 1972. Two-volume set $39.50. Volume I contains broad coverage of 71 general career fields. Volume II is specific. It covers in detail about 650 occupations, and relates each back to the broad coverage in Volume I, where history, developments, future trends and outlook are discussed. Volume II goes into detail about training and other entry-level requirements, wages, etc.

The Encyclopedia of Careers and Vocational Guidance. William E. Hopke. Doubleday and Company, Inc., 501 Franklin Avenue, Garden City, New York 11530. 1966. Two volumes. $39.50. A series of articles, written by an expert in the field. Ranges from career guidance (broad) to job selection (specific).

The Macmillan Job Guide to American Corporations. Ernest A. McKay. The Macmillian Company, 866 Third Avenue, New York, New York 10022. 1967. $7.95. Lists over 250 leading corporations, and the career possibilities in each. Corporate details such as number of employees, fringe benefits, and products are discussed. Educational and personnel requirements are told in detail.

On the Job. Joseph L. Norton, Editor. J. G. Ferguson Publishing Company, 6 North Michigan Avenue, Chicago, Illinois 60602. 1970. $7.95. Work diaries compiled over ten years, covering 65 actual job situations. They approach jobs in a more subjective manner than other publications. More concern is shown for what the worker feels about what he does, on a day-to-day basis.

What to do After High School. Charles G. Spiegler and William B. Reiner. Science Research Associates, Inc. 1971. 75 pages. $2.59. This is aimed primarily at the student who will go into technical or other jobs which require less than a four-year college education. Lists requirements for the various types of jobs, and some of the technical training schools for each.

Your Career Selection Guide. Allen B. Goldenthal, Editor. Regents Publishing Company, Division of Simon and Schuster, 200 Park Avenue South, New York, New York 10003. 1968. 128 pages. Cloth, $3.95; paper, $1.95. Educational requirements and aptitudes needed for about 100 high-demand jobs.

American Personnel and Guidance Association, 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009. All films are 16mm, color, 30 minutes. Titles: Careers in Industry; Careers in Machine Trades; Careers in Skilled Services.

Counselor Films, Inc., 2100 Locust Street, Philadelphia, Pennsylvania 19103. All films are available in 16mm, color, 15 or 16 minutes. Sale: $220, Rental: $30. All are also available as filmstrips, cassettes or videotape cassettes. Two titles are general interest: The World of Work and How A Career Develops. Approximately 15 of the 40 films apply to the manufacturing area. Current catalog available.

Doubleday Media, Box 11607, 1307 Reynolds Avenue, Santa Ana, California 92705. Title: Careers: Technician. 16mm, color, 12 minutes. Sale: $130.50.

Modern Talking Picture Service, 2323 New Hyde Park Road, New Hyde Park, New York 11040. Title: What's So Special About Paper. 16mm, color, 28 1/2 minutes. Free Loan. Request Catalog.

National Audio-Visual Center, General Services Administration, Washington, D.C. 20409. Title: Opportunities in the Machine Trades. 16mm, color, 7 minutes. Sale: $31.25, Rental: $7.50. This government-operated center also has many films on various technical careers in the armed services, which could conceivably be used as stepping stones to civilian careers.

SUGGESTIONS FOR EXTENDED USAGE OF THE INSTRUCTOR'S GUIDE

GENERAL

Primarily, this guide was developed to:

1. Enhance and promote understanding of the Manufacturing Enterprise;

2. Provide a structural model of manufacturing to support and facilitate understanding; and

3. Provide instructional models and related information enabling school system personnel to design, develop and conduct courses directed toward exploring and planning for careers, occupations and/or jobs within the Manufacturing Enterprise.

The main purpose is to provide exploratory experience. The problem yet to be resolved is how much understanding. All of the known knowledges, skills and attitudinal components are within the field encompassed by the terminology--manufacturing. All of the functions, scope, purposes and interests of all other named "clusters," i.e., Transportation, Business, Health, Construction, and Personal Services, are in existence within, and/or highly interact with, manufacturing. There may be some unique specialty in other delineated cluster functions or scope. However, these will not be too different from those encountered within the Manufacturing Enterprise.

The Manufacturing Model was formed in a structural format which is typically generic. This was accomplished to serve the main reason of promoting understanding in a multi-dimensional environmental envelope. Also, Manufacturing, as modeled in order to facilitate exploring and preparing for careers in other related "clusters." Once any cluster is thought of in these three (3) dimensions, higher degrees of relationship can exist. For instance, using the structure of Manufacturing to explore or prepare for careers or occupations in any other "cluster" field is possible, as:

1. Functions would not change in scope; maybe the title, but not basic duties, knowledges and skills; and factory functions might change to service functions.

2. Processes may be delimited to one or two, but keep same scope and purpose; and,

3. Product types and numbers may be reduced considerably, even to concentrating on one category, such as Business Machines for the "Business Cluster."

However, it is hoped that the model will serve the general purpose of providing an interrelationship in and between all clusters in the extended segment of exploration activities.

The instructor and counselor have an opportunity to develop bi-model curricula and better meet conditions of students and their purposes. This can be accomplished by viewing the model in a reductive-abstract sense--as would be the primary case in promoting awareness, orientation and exploration activities. Also, the model is equally useful in a holistic--taxonomic sense--as might be the primary consideration in hard skills acquisition during the preparation phase activities.

When using both instructional modes, the model serves curriculum development in an articulation mode as well.

The educational program growth from the abstract to the specific fits in with standard courses on-going in the secondary school. The curriculum so developed will be related to the world of work and to post-secondary education requisites, should either immediate job-entry or further education be desired.

The other models displayed herein are, also, generic. They can be utilized for direct curriculum development and/or from instruction at discrimination, concept learning and problem solving levels. Equally well, the information and data generated by the models can be utilized to promote field theory learning enterprises should this be desired. The type and kind activity warranted or desired is a matter of model interpretation, reductive or holistic. The counselors and instructors have a choice or can blend each to the degree desired or needed.

The models, and the information and data generated by them, are quite compatible with known and presently used curriculum development models. There should be little loss or conflict encountered by use of the primary models displayed herein when used in concert with standardized curriculum development models.

What is not encompassed within any model is the inclusion of the major shaping parameters affecting how and for what purpose the model is to be used.

The assignment and assessment of worth, values, beliefs and attitudes which can and will evolve as the model is utilized in curricula development is a matter for the school systems student

and support personnel consortia to determine. The scope of usage and assessment will be a function of the curriculum purpose be it training, education or development.

The models presented herein are not generally used for purposes of prediction or control only. The last two dimensions of a research posture. It is hoped that the effort enhances exploratory knowledge, the primary purpose. At the present time, it is suggested that the guidelines presented be used only for that purpose.

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